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User's Manual

SH7086 CPU Board
M3A-HS86

User's Manual

Renesas 32-Bit RISC Microcomputers
SuperH™ RISCengine Family / SH7080 Group

Renesas Electronics
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Rev.1.00 2007.02

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Revision History	SH7086 CPU Board M3A-HS86User's Manual

Rev.	Date of Issue	Content of Revision	
		Page	Contents
1.0	Feb. 6, 2007	-	1st edition issued.

Table of Contents

Chapter1

Overview

1.1 Overview

The M3A-HS86 is the CPU board designed for users to evaluate the functionality and performance of the SH7086 group of Renesas Technology original microcomputers, as well as develop and evaluate the application software for this group of microcomputers. The SH7086's data bus, address bus and various internal peripheral circuit function pins are connected to the extension connector of the M3A-HS86, allowing users to evaluate the timing relationship with peripheral devices using measurement instruments or develop extension boards tailored to suit development purposes. Furthermore, the E10A-USB or the on-chip emulator made by Renesas Technology can also be connected to the M3A-HS86.

1.2 Configuration

Figure1.2.1 shows an example of system configuration using the M3A-HS86.

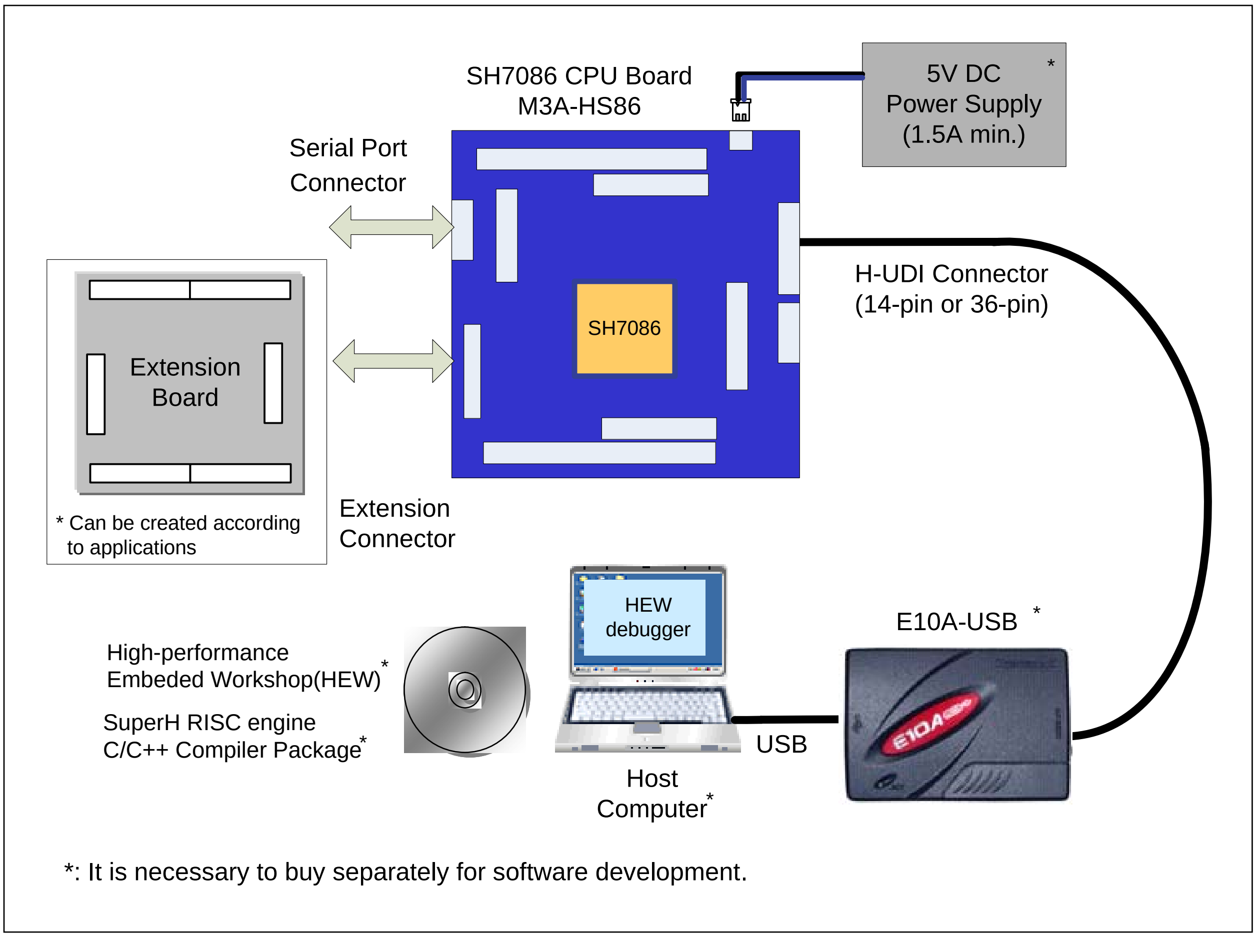


Figure1.2.1 System Configuration Example of M3A-HS86

1.3 External Specifications

Table1.3.1 lists external specifications of M3A-HS86.

Table1.3.1 External Specifications of M3A-HS86

No.	Item	Content
1	CPU	SH7086 ● Input(XIN) clock : 10MHz ● Bus clock : 40MHz,max ● CPU clock : 80MHz,max ● On-chip memory Flash memory : 512KB RAM : 32KB
2	Memory *M3A-HS86(3.3V version) only	● SDRAM : 16 Mbytes.(16-bit bus width) 1pc ● External flash memory enabled to mount
3	Connectors	● Extension connector (Bus, I/O, VCC, GND) ● User I/O connector (SH7086's MTU2 and A/D function pins) ● Serial port connector (D-sub 9pins) ● H-UDI connector (36pins) ● H-UDI connector (14pins)
4	LED	● POWER LED (1pc.) ● LED for interrupt switch (1pc.) ● User LED (7pcs.)
5	Switches	● Reset switch (1pc.) ● NMI switch (1pc.) ● IRQ1 switch (1pc.) ● DIP switch for system setting (1pc.,4 poles) ● DIP switch for users (1pc.,4 poles)
6	Package Dimensions	● Dimensions :100mm x 100mm ● Mounting form :6-layer, double-side mounted ● Board configuration :1 board

1.4 External View

Figure1.4.1 shows the external view of M3A-HS86.

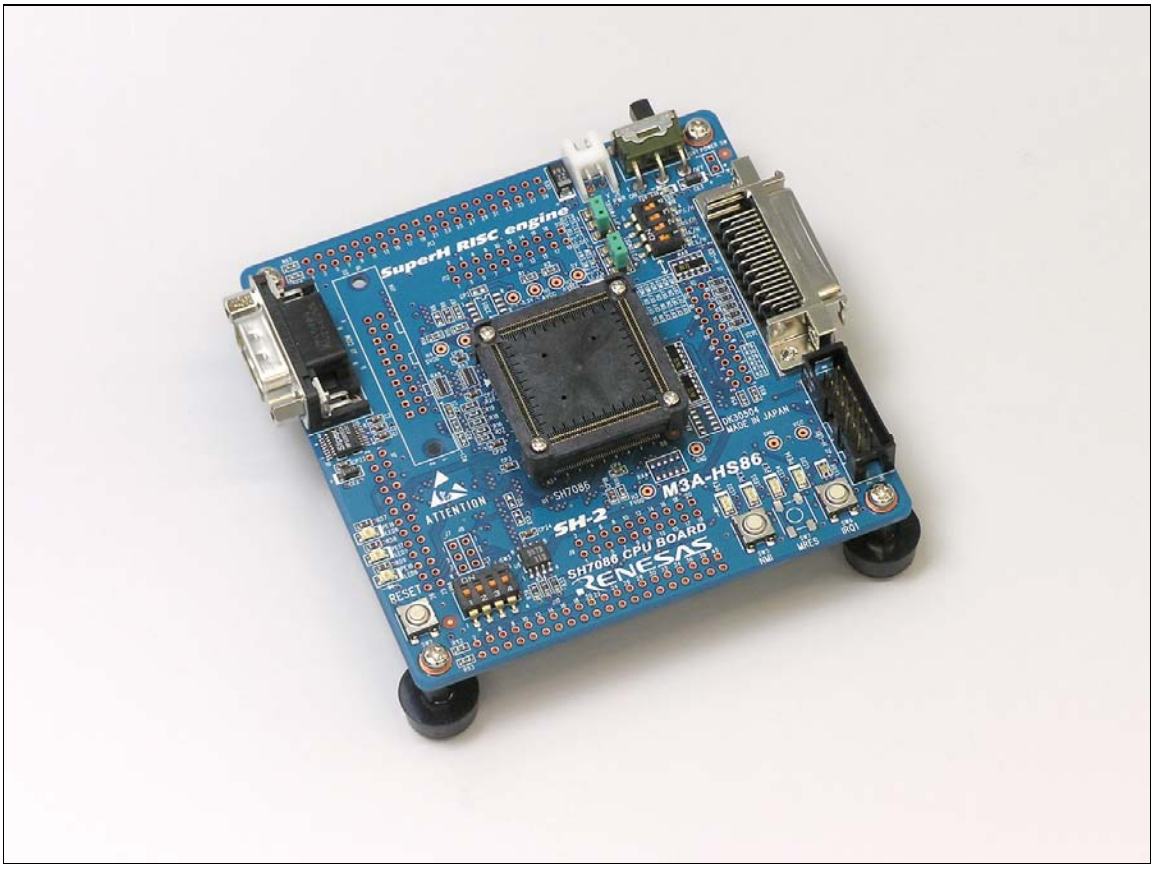


Figure1.4.1 External View of M3A-HS86 (IC socket mounted version)

1.5 M3A-HS86 Block Diagram

Figure1.5.1 shows the system block diagram of M3A-HS86.

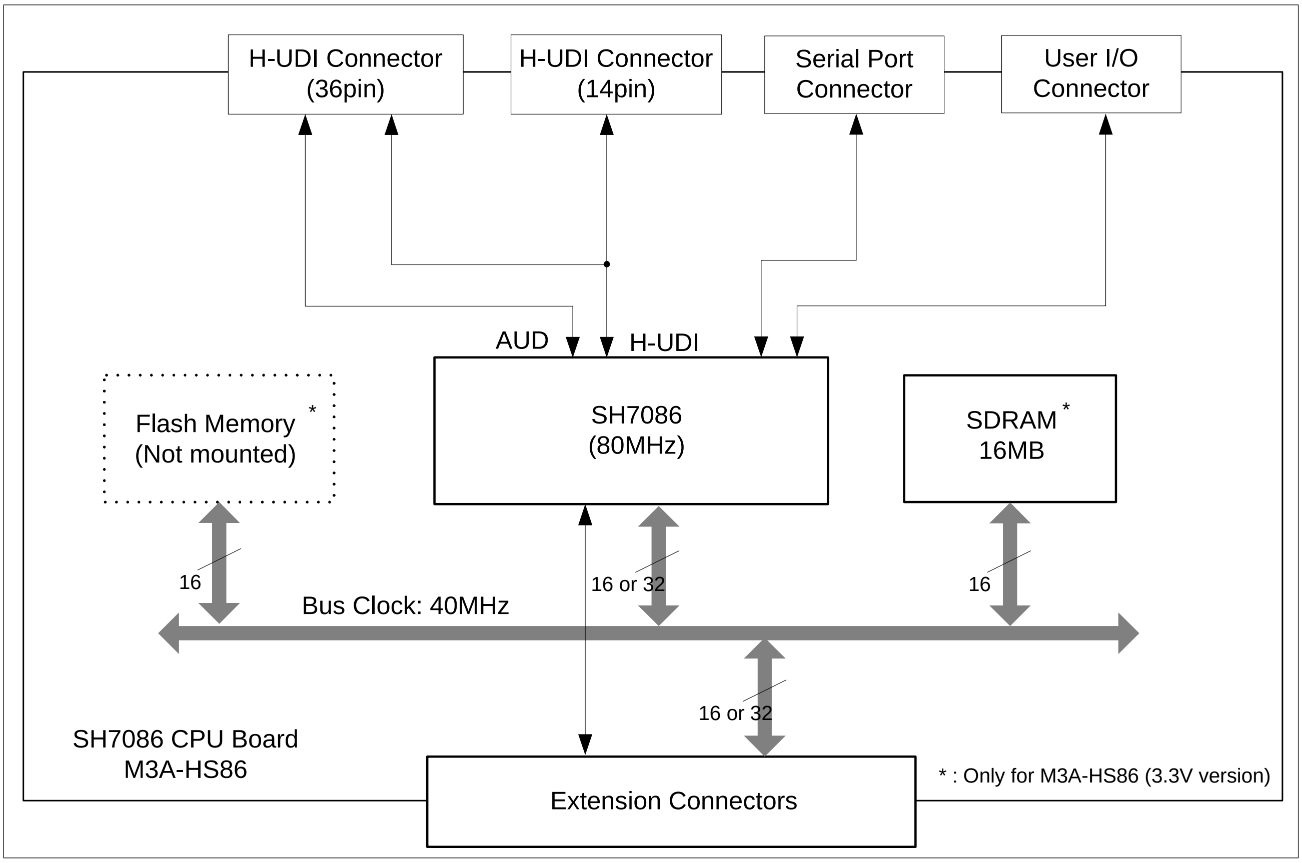
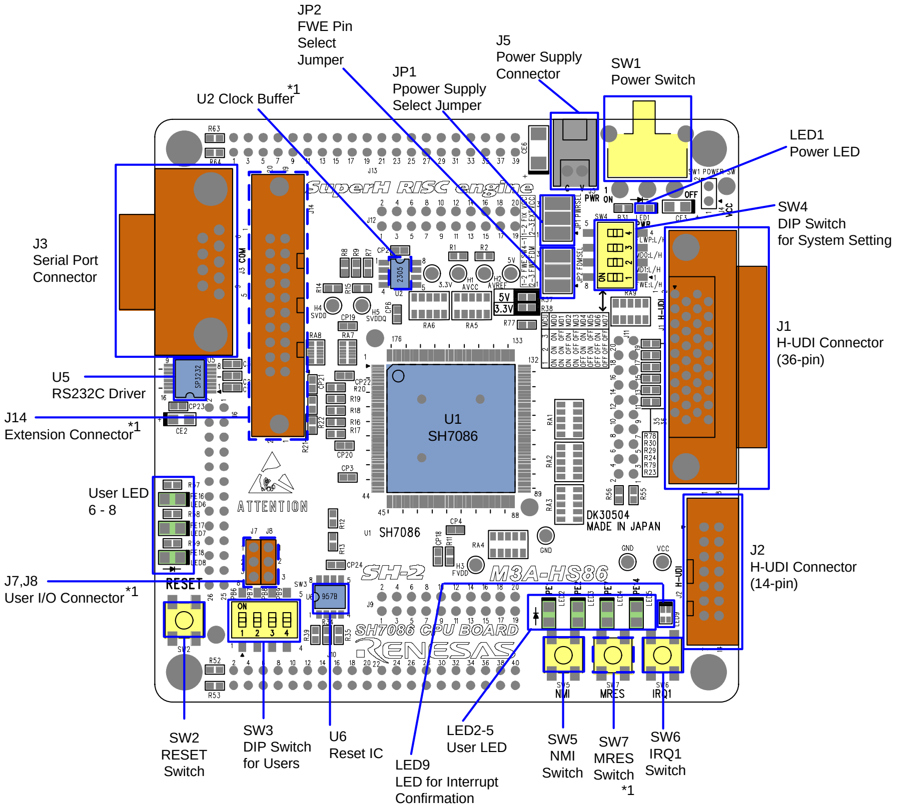


Figure1.5.1 System Block Diagram of M3A-HS86

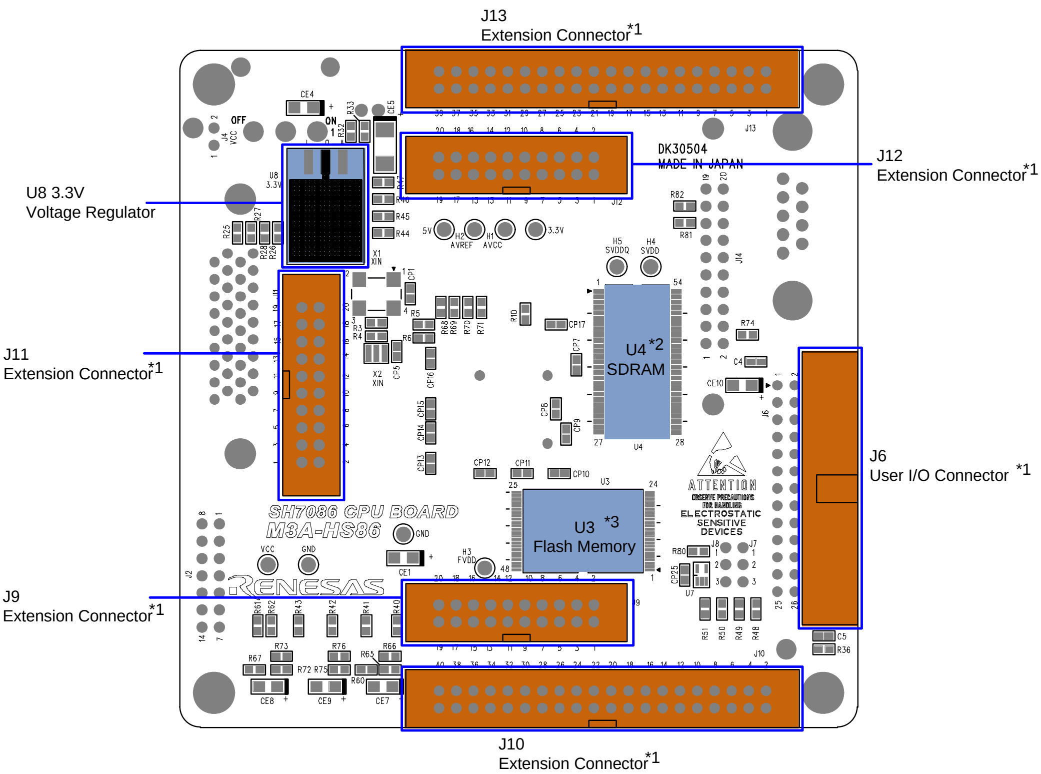
1.6 M3A-HS86 Board Overview

Figure1.6.1 shows the M3A-HS86 board overview.

< Top View of the Component Side >



< Top View of the Solder Side >



Notes: *1: Not mounted *2: 3.3V version only *3: Can be mounted only for 3.3V version

Figure1.6.1 M3A-HS86 Board Overview

Table1.6.1 lists main components mounted in the M3A-HS86.

Table1.6.1 Main Components Mounted in the M3A-HS86

Symbol	Parts Name	Remarks	Recommended parts number for not-mounted components
U1	CPU	SH7086 (Renesas)	
U1	CPU socket	NQPACK176SD	
U2	Clock buffer	Not mounted	CY2305SC-1 (Cypress)
U3	Flash memory	Not mounted (Can be mounted only for 3.3V version)	
U4	SDRAM	3.3V version only	
U5	RS-232C driver		
U6	Reset IC	M51957BFP (Renesas)	
U7	Logic IC		
U8	3.3V voltage regulator		
X1	Oscillator	10.00MHz	
J1	H-UDI connector	36-pin type	
J2	H-UDI connector	14-pin type	
J3	Serial port connector		
J4	External power supply connector	Not mounted	A2-2PA-2.54DSA (Hirose)
J5	Power supply connector		
J6	User I/O connector	Not mounted	XG4C-2634 (Omron)
J7,J8	User I/O connector	Not mounted	A2-3PA-2.54DSA (Hirose)
J9,J11,J12	Extension connector	Not mounted	XG4C-2031 (Omron)
J10.J13	Extension connector	Not mounted	XG4C-4031 (Omron)
J14	Extension connector	Not mounted	3428-6002LCSC (Sumitomo 3M)
LED1	Power LED	Blue	
LED2-8	User LED	Green	
LED9	LED for interrupt confirmation	Red/Yellow green (Two colors)	
SW1	Power switch		
SW2	Reset switch		
SW3	DIP switch for users		
SW4	DIP switch for system setting		
SW5	NMI switch		
SW6	IRQ1 switch		
SW7	MRES switch	Not mounted	B3SN-3012 (Omron)

1.7 M3A-HS86 Memory Mapping

Figure1.7.1, Figure1.7.2 and Figure1.7.3 show a memory mapping example of SH7086 in the M3A-HS86.

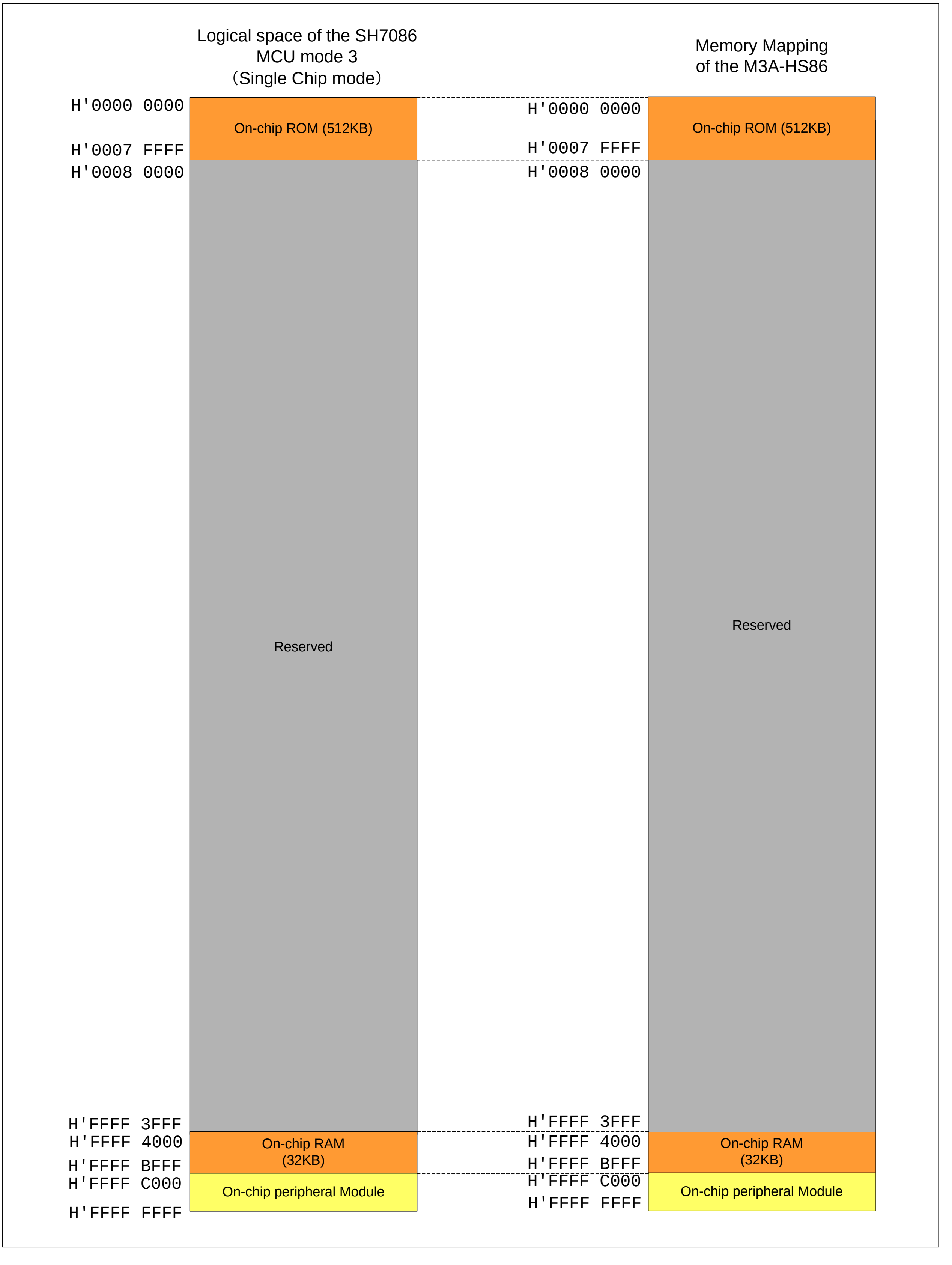
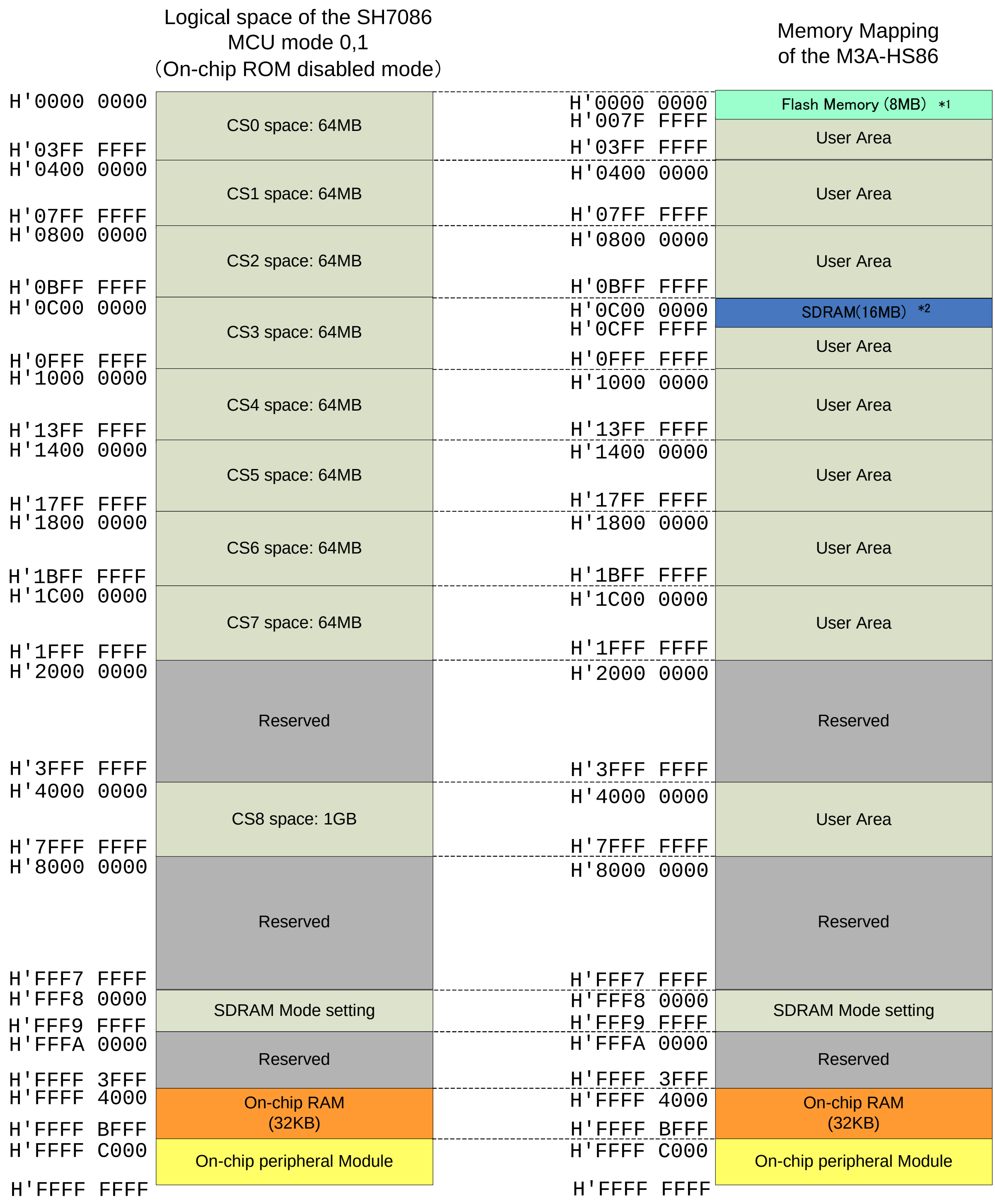
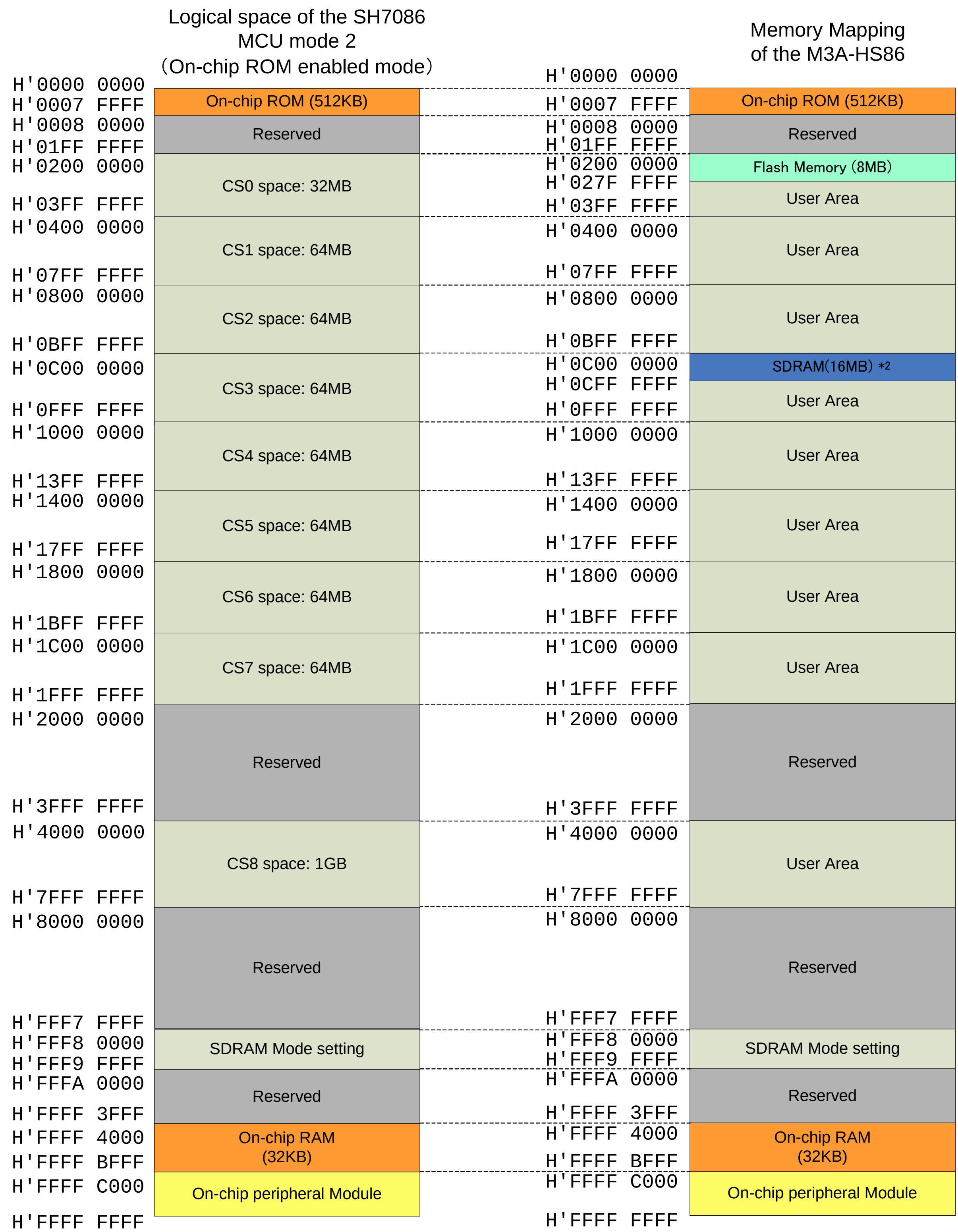


Figure1.7.1 Memory Mapping Example of SH7086 (MCU mode 3)



Notes
*1: For the case that 8MB flash memory is mounted (M3A-HS86(3.3V version) only)
*2: M3A-HS86(3.3V version) only

Figure1.7.2 Memory Mapping Example of SH7086 (MCU mode 0,1)



Notes
*1: For the case that 8MB flash memory is mounted (M3A-HS86(3.3V version) only)
*2: M3A-HS86(3.3V version) only

Figure1.7.3 Memory Mapping Example of SH7086 (MCU mode 2)

1.8 Absolute Maximum Ratings

Table1.8.1 lists the absolute maximum ratings of M3A-HS86.

Table1.8.1 Absolute Maximum Ratings of M3A-HS86

Symbol	Parameter	Rated Value	Remarks
5VCC	5V system power supply voltage	-0.3V to 6.0V	Relative to VSS
3VCC	3.3V system power supply voltage	-0.3V to 4.6V	Relative to VSS
Topr	Operating ambient temperature	-0°C to 50°C	No dewdrops allowed. Use in corrosive gas environment prohibited.
Tstr	Storage ambient temperature	-10°C to 60°C	No dewdrops allowed. Use in corrosive gas environment prohibited.

Note: The ambient temperature refers to the air temperature in places closest possible to the board.

1.9 Recommended Operating Conditions

Table1.9.1 lists the recommended operating conditions of M3A-HS86.

Table1.9.1 Recommended Operating Conditions of M3A-HS86

Symbol	Parameter	Rated Value	Remarks
5VCC	5V system power supply voltage	4.75V to 5.25V	Relative to VSS
3VCC	3.3V system power supply voltage	3.0V to 3.6V	Relative to VSS
-	Maximum current consumption in the board	Within 1A	
Topr	Operating ambient temperature	0°C to 50°C	No dewdrops allowed. Use in corrosive gas environment prohibited.

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Chapter2

Functional Overview

2.1 Functional Overview

The M3A-HS86 is the SH7086 CPU board that has the functions listed in Table2.1.1.

Table2.1.1 lists the functional modules of M3A-HS86.

Table2.1.1 Functional Modules of M3A-HS86

Sections	Functions	Contents
2.2	CPU	SH7086 ● Input(XIN) clock : 10MHz ● Bus clock : 40MHz,max ● CPU clock : 80MHz,max ● On-chip memory - Flash memory: 512KB - RAM : 32KB
2.3	Memory *M3A-HS86(3.3V version) only	● SDRAM : 16 Mbytes(16-bit bus width) 1pc. ● External flash memory enabled to mount
2.4	Serial Port Interface	Connects SCI1 of the SH7086 to the Serial Port connector
2.5	I/O Ports	Connects to the input/output ports of the SH7086
2.6	Power Supply Circuit	Controls the system power supply of the M3A-HS86
2.7	Clock Module	Controls the system clock
2.8	Reset Module	Controls device reset mounted on the M3A-HS86
2.9	Interrupt Switches	Connect to the NMI and IRQ1 pins
2.10	E10A-USB Interface	SH7086 H-UDI/AUD interface
-	Operational specifications	Connectors, switches and LEDs ● SH7086 extension connector ● Switches and LEDs ● H-UDI connector Detailed in Chapter 3.

2.2 CPU

The M3A-HS86 contains the 32-bit RISC microcomputer SH7086 that operates with a maximum 80MHz of CPU clock frequency. The SH7086 includes 512-Kbyte flash memory, and 32-Kbyte SRAM, making it useful in a wide range of applications from data processing to equipment control.

The M3A-HS86 can be operated with a maximum 80MHz of CPU clock frequency (external bus 40MHz, max) using a 10MHz input clock.

Figure2.2.1 shows the SH7086 block diagram in the M3A-HS86.

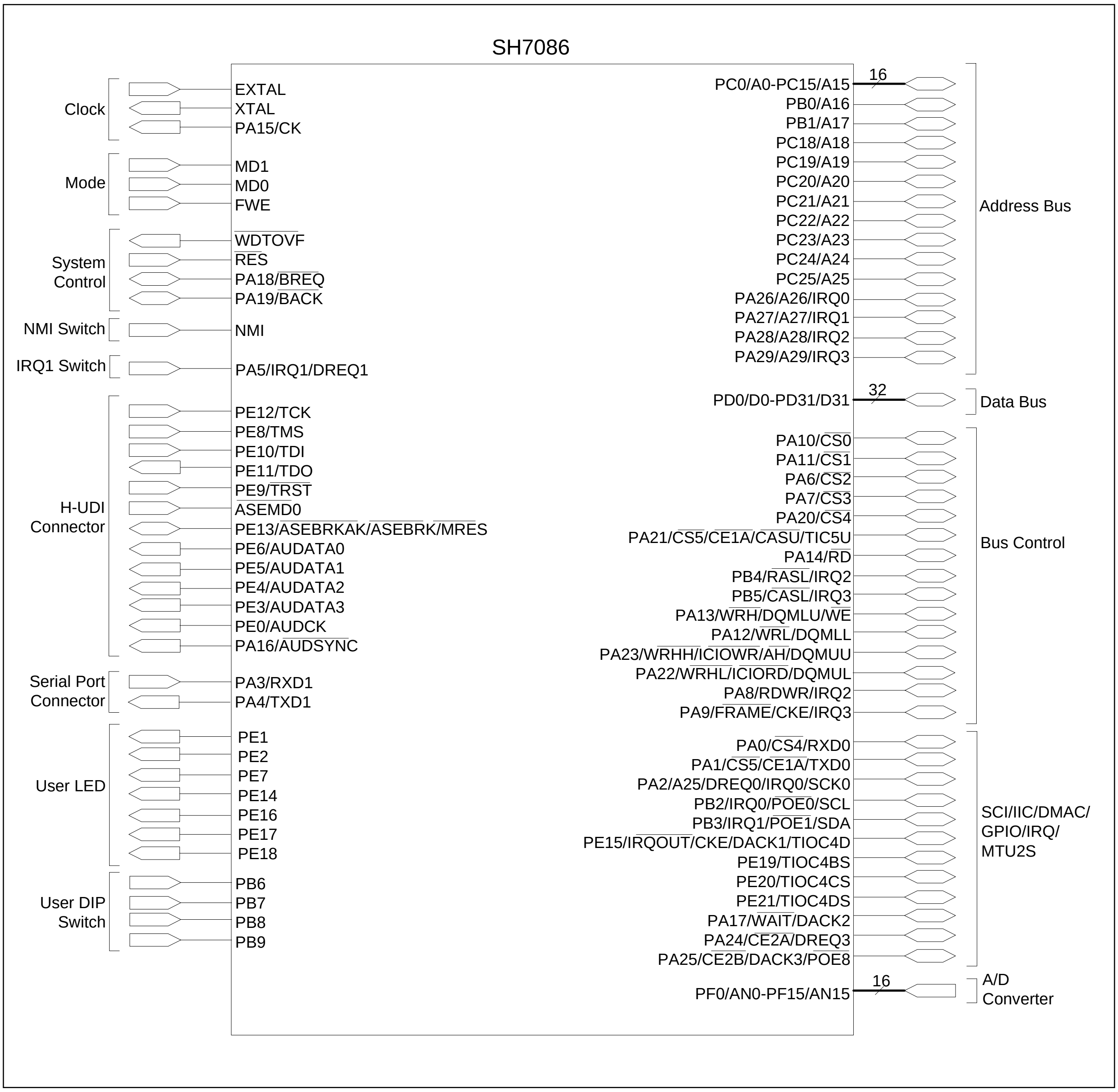


Figure2.2.1 SH7086 Block Diagram

2.3 Memory

2.3.1 SH7086 On-chip Memory

The SH7086 includes 512-Kbyte flash memory and 32-Kbyte SRAM.

2.3.2 SDRAM

The M3A-HS86 (3.3V version) mounts 16MB SDRAM as standard equipment. SDRAM is controlled by the bus state controller built into SH7086. Table2.3.1 lists SDRAM specifications used in M3A-HS86. Figure2.3.1 shows the block diagram of SDRAM connection.

Table2.3.1 SDRAM Specifications

Specifications	Contents
Configuration	16 Mbytes (16-bit bus) x 1pc.
Capacity	16 Mbytes
Access Time	5.4ns
CAS Latency	2(at 40MHz bus clock)
Refresh Interval	4,096 refresh cycles every 64ms
Row Address	A11- A0
Column Address	A8 - A0
Number of Banks	4-bank operation controlled by BA0 and BA1

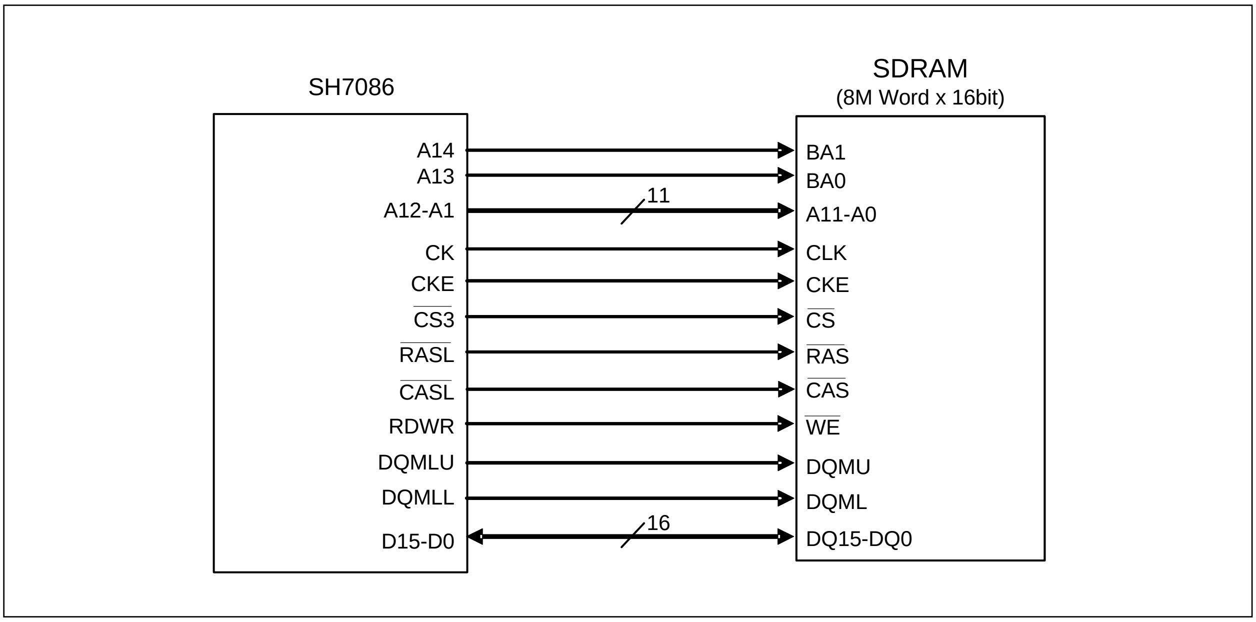


Figure2.3.1 Block Diagram of SDRAM Connection

Table2.3.2 lists an example of bus state controller settings for operation with the SH7086 Bus clock at 40MHz.

Table2.3.2 Example of Bus State Controller Settings at SDRAM

User Area	SDRAM Controller Settings
CS3	**CS3 Space Bus Control Register(CS3BCR)** Initial value :H'36DB 0600 Recommended set value : H'1000 4400 - Specify idle cycles between write-read cycles and write-write cycles IWW[2:0] = 001 ; 1 idle cycle inserted - Specify memory type : TYPE[2:0] = 100 ;SDRAM - Data bus size : BSZ[1:0] = B'10 ;16-bit size **CS3 Space Wait Control Register(CS3WCR)** Initial value : H'0000 0500 Recommended set value :H'0000 4891 - Number of Auto-Precharge Completion Wait Cycles TRP[1:0] = 10 ;3 cycles - Wait Cycles between ACTV Command and READ(A)/WRIT(A) Command TRCD[1:0] = 10 ;3 cycles - Area 3 CAS latency A3CL[1:0] = 01 ;2 cycles - WRIT(A) command→Number of Auto-Precharge/PRE Command cycles TRWL[1:0] = 10 ;2 cycles - REF Command/Self-Refresh Release→Number of ACTV/REF/MRS Command cycles. TRC[1:0] = 01 ; 4 cycles **SDRAM Control Register(SDCR)** Initial value : H'0000 0000 Recommended set value : H'0000 0809 - Refresh control RFSH = 1 ; Refresh enabled - Refresh control RMODE = 0 ; Auto refresh - Bank active mode BACTV = 0 ;Auto precharge mode - Number of area3 row address bits A3ROW[1:0] = 01 ;12 bits - Number of area3 column address bits A3COL[1:0] = 01 ;9 bits **Refresh Timer Control/Status Register(RTCSR)** Initial value : H'0000 0000 Recommended set value : H'A55A 0010 - Clock select CKS[2:0] = 010 ;Bϕ/16 - Refresh times RRC[2:0] = 000 ; 1 time **Refresh Time Constant Register(RTCOR)** Initial value : H'0000 0000 Recommended set value : H'A55A 0027 *The following shows refresh request intervals in cases when clock select is set to Bϕ/16. 1 cycle :400nsec(40MHz/16 = 2.5MHz) Refresh request intervals for the SDRAM : every 15.625µsec 15.625µsec /400nsec = 39(0x27) cycles / refresh

Figure2.3.2 shows an example of SDRAM single read/write timing for operation with the SH7086 Bus clock at 40MHz.

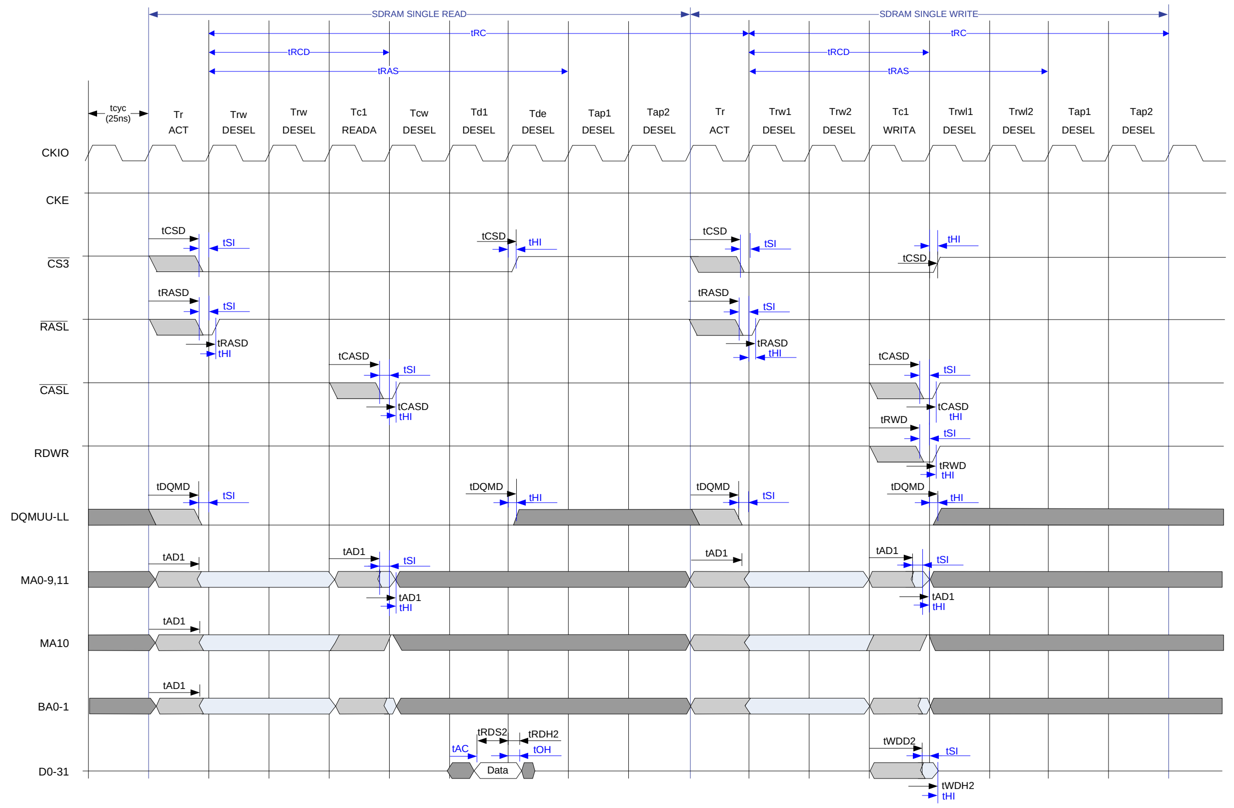


Figure2.3.2 Example of SDRAM Single Read/Write Timing

2.3.3 Expand of Flash Memory

M3A-HS86 has installed the mounting space to which the flash memory can be expanded externally.
The mountable flash memory is 32M bit or 64M bit flash memory with 3.3V power-supply voltage, 16-bit bus width, and TSOP-48 pin (20 x 12mm).
By a DIP switch (SW4-4), the validity or invalidity of write protect for flash memory can be switched.
Figure2.3.3 shows an example of 32-Mbit Flash Memory connection.

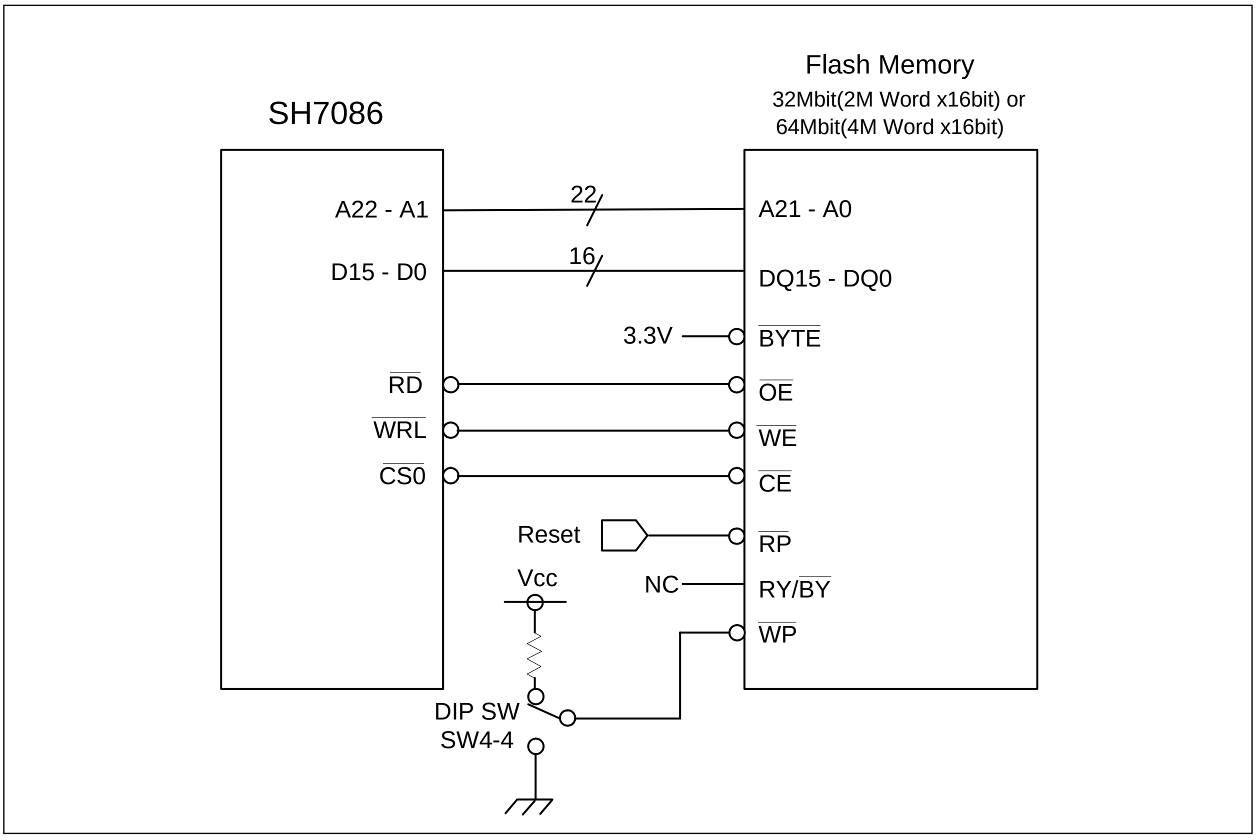


Figure2.3.3 Connection Example with Flash Memory

Note: Only the M3A-HS86 (3.3V version) can connect the flash memory to outside.

2.4 Serial Port Interface

The SH7086 included in the M3A-HS86 contains a UART module. In the M3A-HS86, SCI channel 1 is connected to Serial Port connector J3.

Figure2.4.1 shows the block diagram of serial port interface in the M3A-HS86.

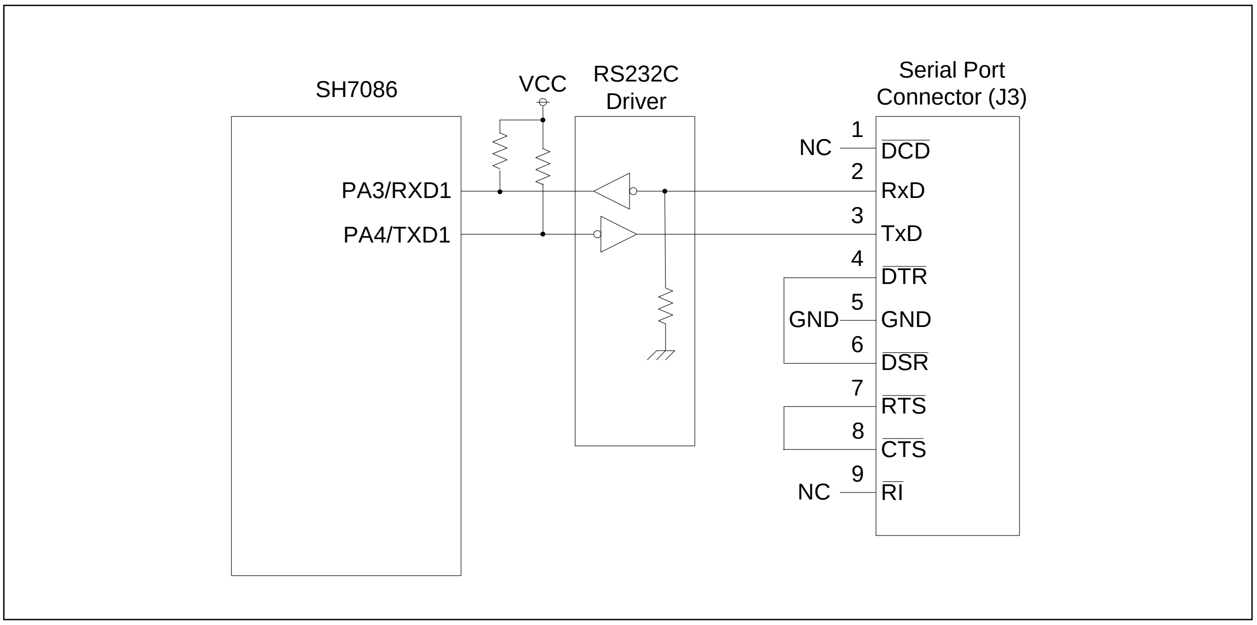


Figure2.4.1 Block Diagram of Serial Port Interface

2.5 I/O Ports

In the M3A-HS86, all of the SH7086's I/O ports are connected to the extension bus connector. Some I/O ports are connected to DIP switches and LEDs of the M3A-HS86 board. Users are free to use these ports.

Figure2.5.1 shows the Block Diagram of DIP Switch and LEDs in the M3A-HS86.

Table2.5.1 to Table 2.5.3 list a function of the SH7086 I/O ports in the M3A-HS86.

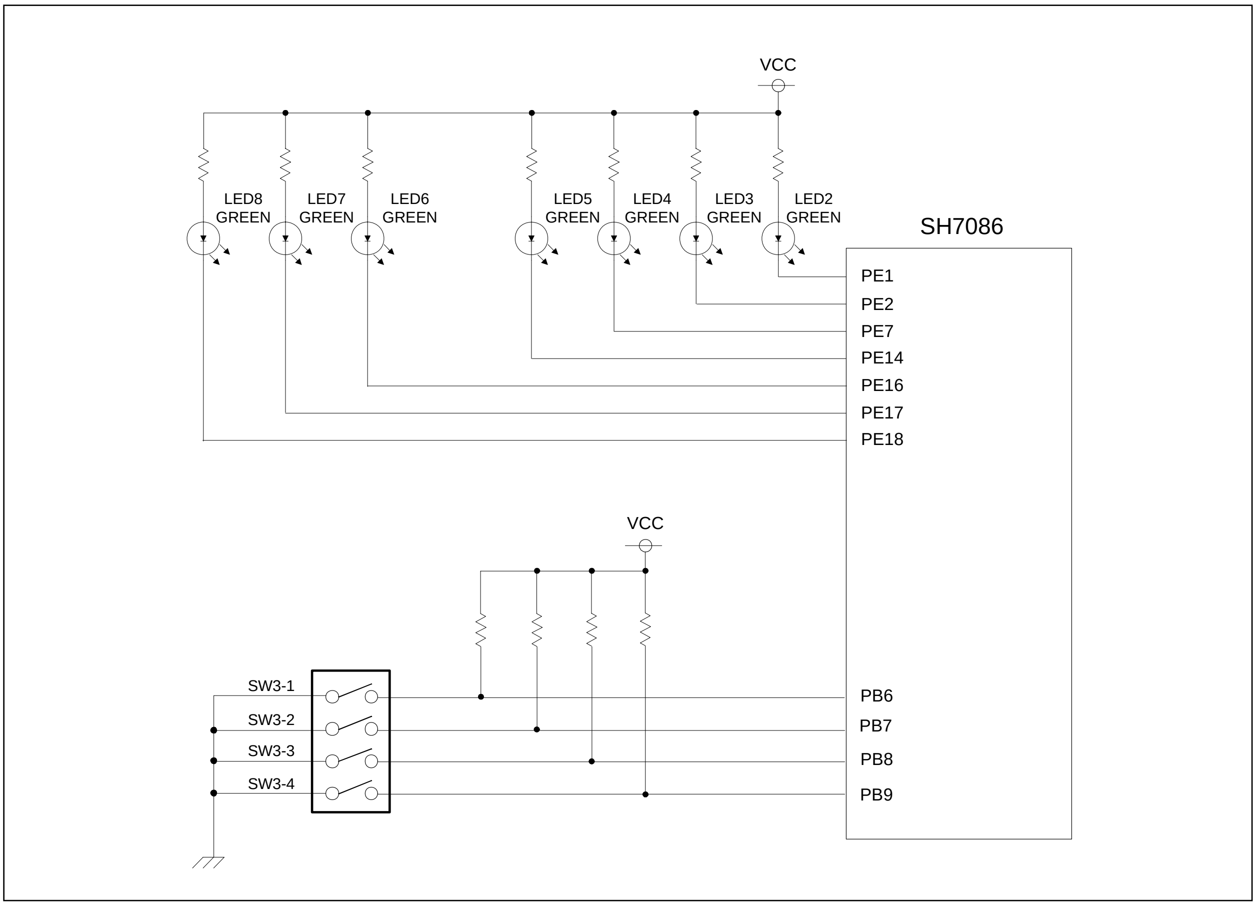


Figure2.5.1 Block Diagram of DIP Switch and LEDs in M3A-HS86

Table2.5.1 Functions of SH7086 I/O Ports

SH7086		Connection Destinations on M3A-HS86									
Pin No.	Pin Name	Extension Connector									Other Connections
		J6	J7	J8	J9	J10	J11	J12	J13	J14	
1	PE12/TIOC4A/TXD3/SCS/TCK							●			H-UDI connector (J1,J2)
2	PE13/TIOC4B/MRES/ASEBRKAK/ASEBRK							●			H-UDI connector (J1,J2) MRES SW (Not mounted)
3	PA23/WRHH/ICIOWR/AH/DQMUU/TIC5W	●					●				
4	PE14/WRHH/ICIOWR/AH /DQMUU/DACK0/TIOC4C							●			LED5
5	PA22/WRHL/ICIORD/DQMUL/TIC5V	●					●				
6	PA21/CS5/CE1A/CASU/TIC5U	●				●					
7	PE15/CKE/DACK1/TIOC4D/IRQOUT							●			
9	PE16/CS8/TIOC3BS	●					●				User Port (LED6)
10	PE17/TIOC3DS	●									User Port (LED7)
12	PE18/TIOC4AS	●									User Port (LED8)
13	PE19/TIOC4BS	●									
14	PE20/TIOC4CS	●									
15	PE21/TIOC4DS	●									
16	PC0/A0					●					
17	PC1/A1					●					Flash, SDRAM *1
18	PC2/A2					●					Flash, SDRAM *1
19	PC3/A3					●					Flash, SDRAM *1
20	PC4/A4					●					Flash, SDRAM *1
22	PC5/A5					●					Flash, SDRAM *1
24	PC6/A6					●					Flash, SDRAM *1
25	PC7/A7					●					Flash, SDRAM *1
26	PC8/A8					●					Flash, SDRAM *1
27	PC9/A9					●					Flash, SDRAM *1
28	PC10/A10					●					Flash, SDRAM *1
29	PC11/A11					●					Flash, SDRAM *1
30	PC12/A12					●					Flash, SDRAM *1
31	PC13/A13					●					Flash, SDRAM *1
32	PC14/A14					●					Flash, SDRAM *1
33	PC15/A15					●					Flash *1
34	PB0/A16/TIC5WS					●					Flash *1
36	PB1/A17/TIC5W					●					Flash *1
38	PA20/CS4/RASU					●					
39	PA19/BACK/TEND1						●				
40	PB2/IRQ0/POE0/SCL						●				
41	PB3/IRQ1/POE1/SDA						●				
42	PA18/BREQ/TEND0						●				
43	PB4/RASL/IRQ2/POE2						●				SDRAM *1
45	PB5/CASL/IRQ3/POE3						●				SDRAM *1
46	PB6/A18/BACK/IRQ4/RXD0	●									User Port (Dip SW)
47	PB7/A19/BREQ/IRQ5/TXD0	●									User Port (Dip SW)
49	PB8/A20/WAIT/IRQ6/SCK0	●									User Port (Dip SW)
50	PB9/A21/IRQ7/ADTRG/POE8	●									User Port (Dip SW)
52	PA14/RD								●		Flash *1
54	PC18/A18					●					Flash *1

Note *1: Only for 3.3V version

Table 2.5.2 Functions of SH7086 I/O Ports

SH7086		Connection destinations on M3A-HS86									
Pin No.	Pin Name	Extension Connector									Other Connections
		J6	J7	J8	J9	J10	J11	J12	J13	J14	
55	PC19/A19					●					Flash *1
56	PC20/A20					●					Flash *1
58	PC21/A21					●					Flash *1
59	PC22/A22					●					
60	PC23/A23					●					
61	PC24/A24					●					
62	PC25/A25					●					
63	PA26/A26/IRQ0	●			●						
65	PA27/A27/IRQ1	●			●						
67	PA28/A28/IRQ2	●			●						
68	PA29/A29/IRQ3	●			●						
69	PD31/D31/TIOC3AS/ADTRG								●		
70	PD30/D30/TIOC3CS/IRQOUT								●		
72	PA13/WRH/DQMLU/WE/POE7						●				SDRAM *1
73	PA12/WRL/DQMLL/POE6						●				Flash, SDRAM *1
75	PA11/CS1/POE5					●					
76	PA10/CS0/POE4					●					Flash *1
77	PA9/FRAME/CKE/IRQ3/TCLKD						●				SDRAM *1
78	PA8/RDWR/IRQ2/TCLKC						●				SDRAM *1
79	PA7/CS3/TCLKB						●				SDRAM *1
80	PA6/CS2/TCLKA				●	●					
81	PD29/D29/CS3/TIOC3BS								●		
82	PD28/D28/CS2/TIOC3DS								●		
83	PD27/D27/DACK1/TIOC4AS								●		
84	PD26/D26/DACK0/TIOC4BS								●		
85	PD25/D25/DREQ1/TIOC4CS								●		
87	PD24/D24/DREQ0/TIOC4DS								●		
88	PD23/D23/IRQ7/AUDSYNC								●		
89	PD22/D22/IRQ6/TIC5US/AUDCK		●						●		
90	PD21/D21/IRQ5/TIC5VS/AUDMD		●						●		
91	PD20/D20/IRQ4/TIC5WS/AUDRST		●						●		
92	PD19/D19/IRQ3/POE7/AUDATA3								●		
93	PD18/D18/IRQ2/POE6/AUDATA2								●		
95	PD17/D17/IRQ1/POE5/AUDATA1								●		
97	PD16/D16/IRQ0/POE4/AUDATA0								●		
98	PD15/D15/TIOC4DS								●		Flash, SDRAM *1
99	PD14/D14/TIOC4CS								●		Flash, SDRAM *1
100	PD13/D13/TIOC4BS								●		Flash, SDRAM *1
101	PD12/D12/TIOC4AS								●		Flash, SDRAM *1
103	PD11/D11/TIOC3DS								●		Flash, SDRAM *1
105	PD10/D10/TIOC3CS								●		Flash, SDRAM *1
106	PD9/D9/TIOC3BS								●		Flash, SDRAM *1
107	PD8/D8/TIOC3AS								●		Flash, SDRAM *1
108	PD7/D7/TIC5WS								●		Flash, SDRAM *1
110	PD6/D6/TIC5VS								●		Flash, SDRAM *1
111	PD5/D5/TIC5US								●		Flash, SDRAM *1

Note *1: Only for 3.3V version

Table 2.5.3 Functions of SH7086 I/O Ports

SH7086		Connection Destinations on M3A-HS86									
Pin No.	Pin Name	Extension Connector									Other Connections
		J6	J7	J8	J9	J10	J11	J12	J13	J14	
112	PD4/D4/TIC5W								●		Flash, SDRAM *1
113	PD3/D3/TIC5V								●		Flash, SDRAM *1
114	PD2/D2/TIC5U								●		Flash, SDRAM *1
115	PD1/D1								●		Flash, SDRAM *1
116	PD0/D0								●		Flash, SDRAM *1
124	PA16/WRHH/ICIOWR/AH/DQMUU /CKE/DREQ2/AUDSYNC							●			H-UDI connector (J1)
125	PA17/WAIT/DACK2								●		
126	PA24/CE2A/DREQ3						●				
127	PA25/CE2B/DACK3/POE8						●				
131	PA15/CK					●		●			SDRAM *1
133	PE0/DREQ0/TIOC0A/AUDCK							●			H-UDI connector (J1)
134	PE1/TEND0/TIOC0B/AUDMD								●		LED2
135	PE2/DREQ1/TIOC0C/AUDRST								●		LED3
137	PE3/TEND1/TIOC0D/AUDATA3							*2			H-UDI connector (J1)
138	PE4/IOIS16/TIOC1A/RXD3/AUDATA2							*2			H-UDI connector (J1)
139	PE5/CS6/CE1B/TIOC1B/TXD3/AUDATA1							*2			H-UDI connector (J1)
140	PE6/CS7/TIOC2A/SCK3/AUDATA0							*2			H-UDI connector (J1)
143	PF0/AN0			●							
144	PF1/AN1	●									
145	PF8/AN8	●									
146	PF9/AN9	●									
147	PF2/AN2	●									
148	PF3/AN3	●									
149	PF10/AN10				●						
150	PF11/AN11				●						
152	PF4/AN4	●									
153	PF5/AN5			●							
154	PF12/AN12				●						
155	PF13/AN13				●						
157	PF6/AN6			●							
158	PF7/AN7	●									
159	PF14/AN14				●						
160	PF15/AN15				●						
164	PA0/CS4/RXD0				●						
165	PA1/CS5/CE1A/TXD0				●						
166	PA2/A25/DREQ0/IRQ0/SCK0				●						
167	PA3/A24/RXD1									●	Serial port (J3)
169	PA4/A23/TXD1									●	Serial port (J3)
170	PA5/A22/DREQ1/IRQ1/SCK1				●						IRQ1 SW
171	PE7/BS/TIOC2B/UBCTRG/RXD2/SSI						●	●			LED4
172	PE8/TIOC3A/SCK2/SSCK/TMS						●				H-UDI connector (J1,J2)
174	PE9/TIOC3B/SCK3/RTS3/TRST							●			H-UDI connector (J1,J2)
175	PE10/TIOC3C/TXD2/SSO/TDI						●				H-UDI connector (J1,J2)
176	PE11/TIOC3D/RXD3/CTS3/TDO							●			H-UDI connector (J1,J2)

Note *1: Only for 3.3V version

*2: Connected only when the 0Ω resistance is mounted. It is not mounted Initially.

2.6 Power Supply Circuit

The M3A-HS86 accepts a 5V power supply as its input and generates 3.3V from it by using a regulator.
The M3A-HS86 (3.3V version) and M3A-HS86 (5V version) are different according to whether R37 and R38 are mounted.

- M3A-HS86 (3.3V version) : R37 is not mounted, R38 is mounted
- M3A-HS86 (5V version) : R37 is mounted, R38 is not mounted

Figure2.6.1 shows the block diagram of power supply circuit in the M3A-HS86.

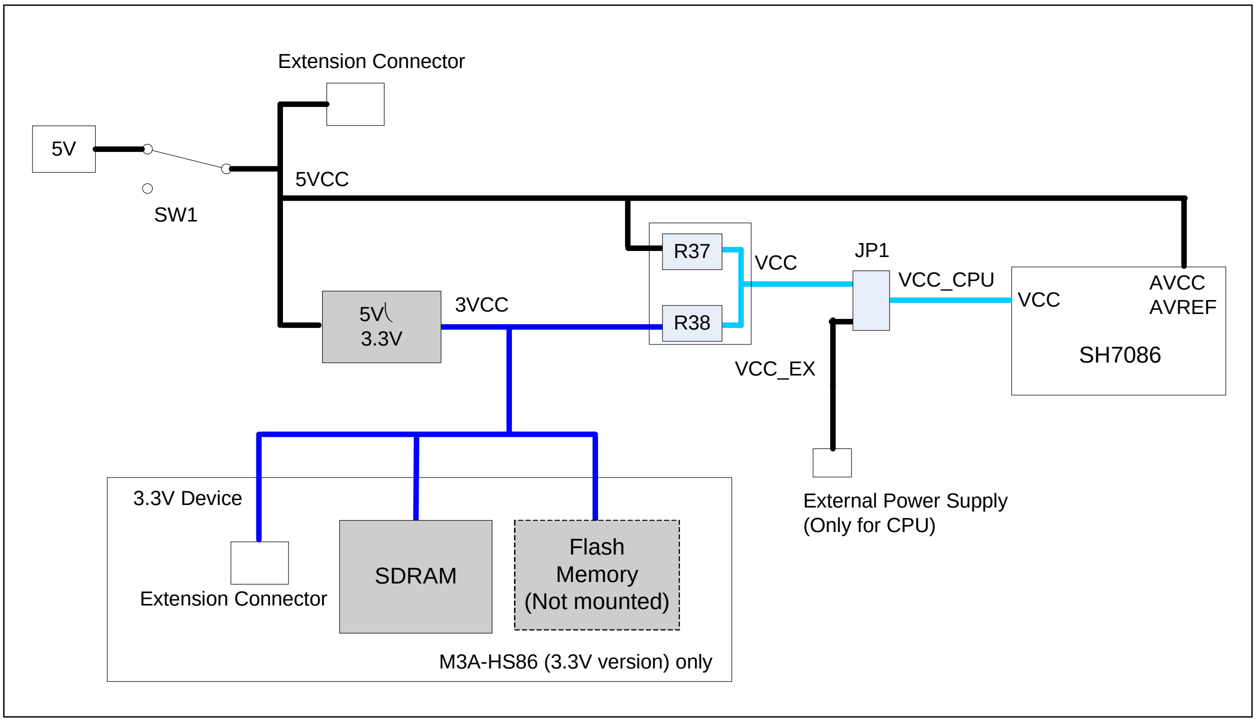


Figure2.6.1 Block Diagram of Power Supply Circuit

2.7 Clock Module

The clock module in the M3A-HS86 consists of the following two blocks:

- Output from a oscillator connected to EXTAL of the SH7086
- Ceramic resonator connected to EXTAL and XTAL

The M3A-HS86 has a 10MHz oscillator connected to it as standard specification.

The system clock output (PA15/CK) of SH7086 is connected to an extension connector through the damping resister. To connect an extension board to an extension connector, we recommend including a clock buffer that contains a PLL to ensure that the board will be supplied with a stable clock signal.

Figure2.7.1 shows the block diagram of clock module.

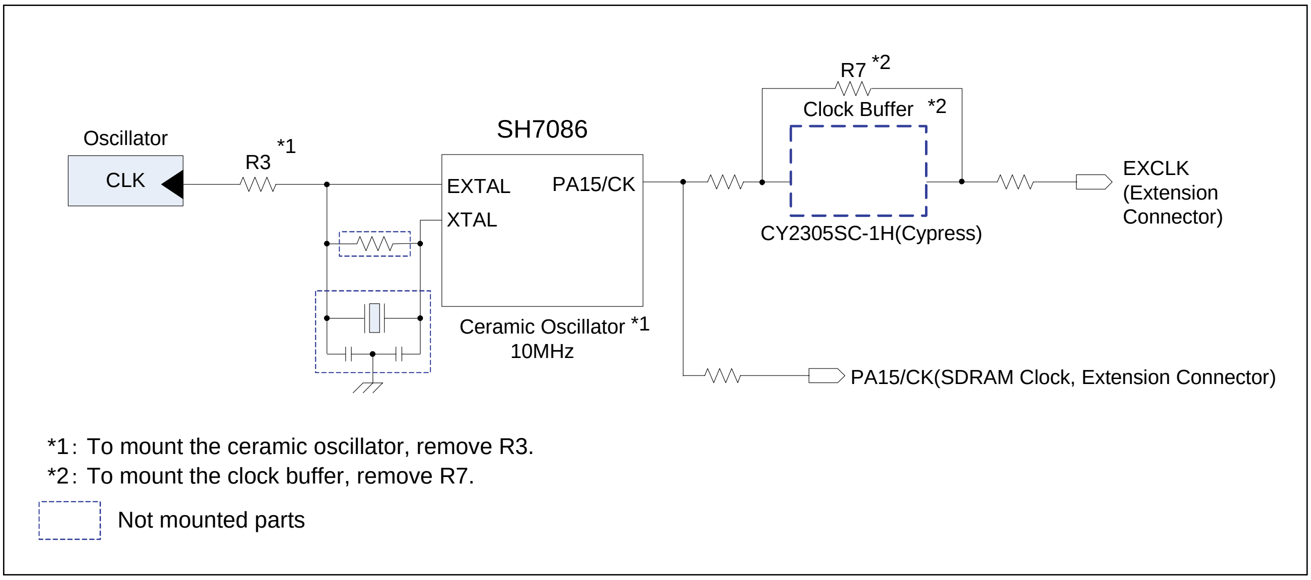


Figure2.7.1 Block Diagram of Clock Module

2.8 Reset Module

Reset module controls the reset signal connected to the SH7086, which mounted on the M3A-HS86. Moreover, when the flash memory is mounted, it is used as a reset signal of the flash memory.

Figure2.8.1 shows the block diagram of reset module in the M3A-HS86.

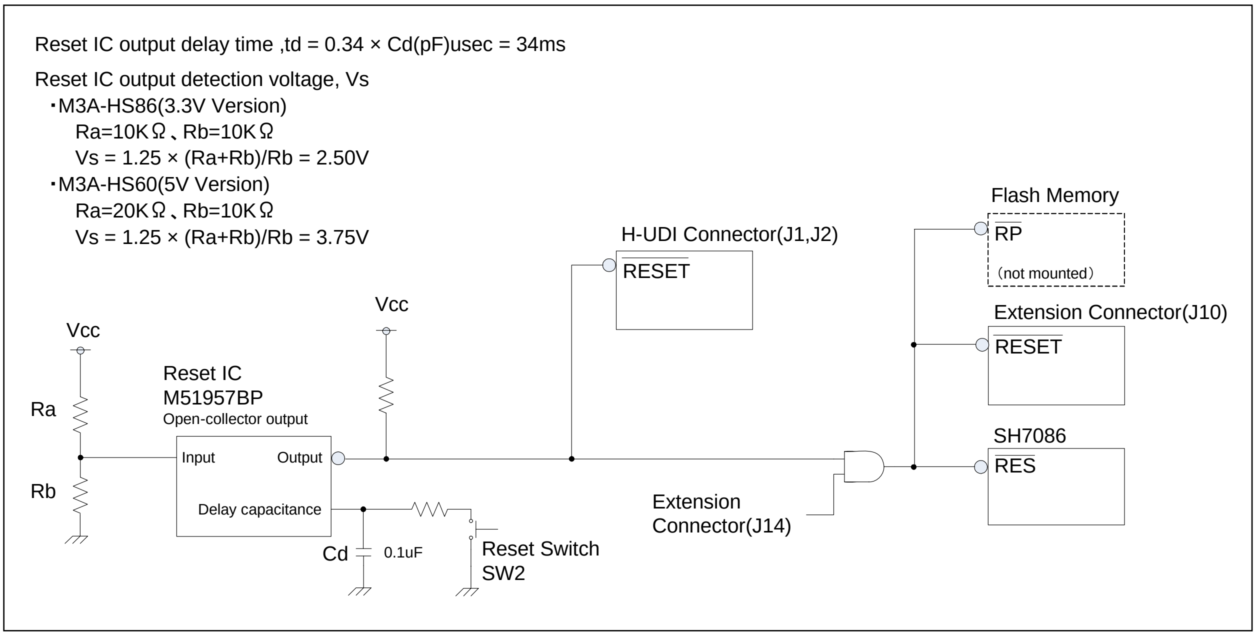


Figure2.8.1 Block Diagram of Reset Module

2.9 Interrupt Switches

In the M3A-HS86, the switch is connected with the PA5/IRQ1 pin and NMI pin of the SH7086. LED to confirm that the switch has been pushed is connected. In addition, MRES switch can be mounted on PE13/$\overline{\text{MRES}}$ pin. However, it cannot be mounted when E10A-USB is used because $\overline{\text{MRES}}$ pin is multiplexed with the signal $\overline{\text{ASEBRKAK}}$/$\overline{\text{ASEBRK}}$.

Figure2.9.1 shows the interrupt block diagram in the M3A-HS86.

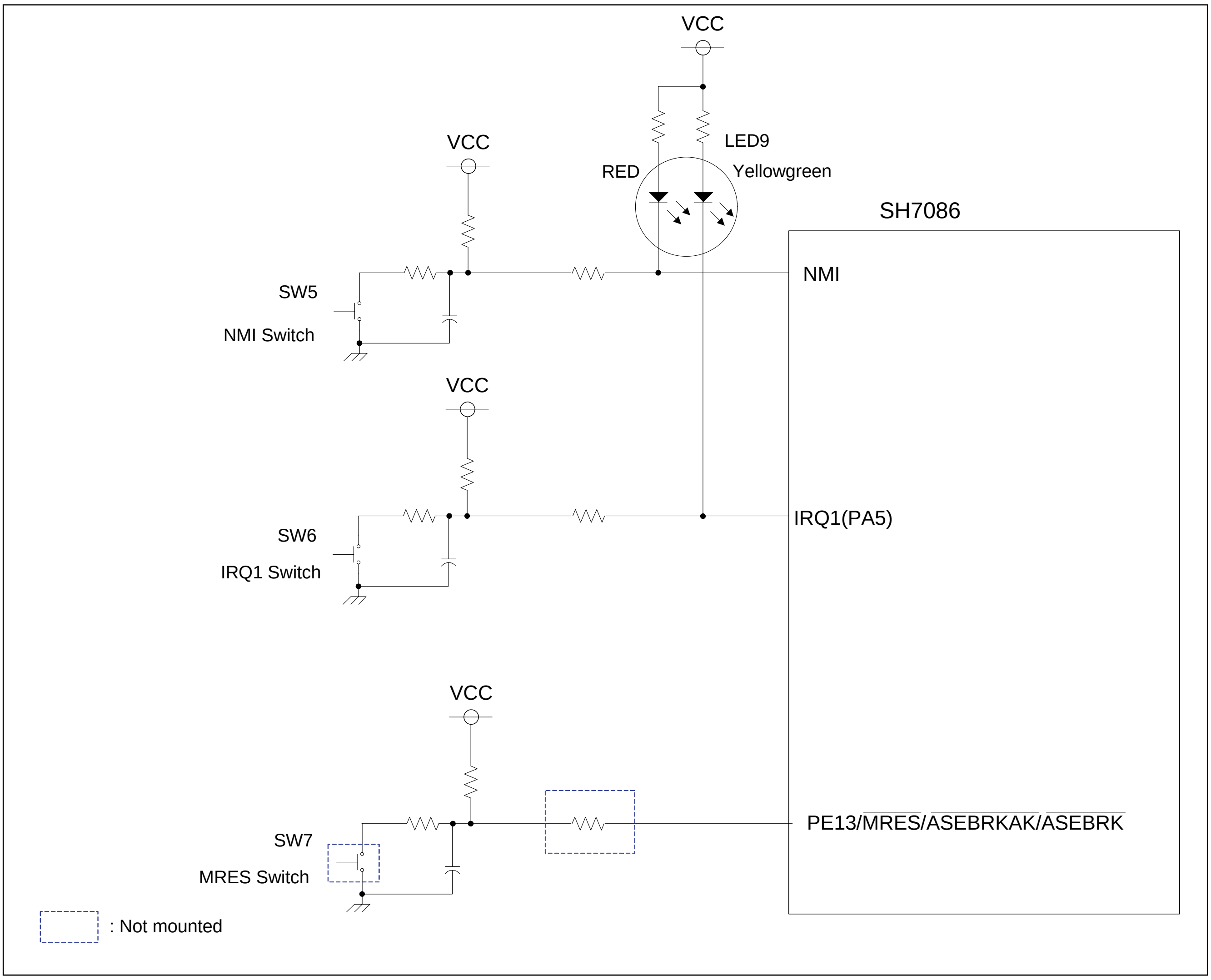


Figure2.9.1 Interrupt Block Diagram

2.10 E10A-USB Interface

The M3A-HS86 has a 36-pin H-UDI connector and 14-pin H-UDI connector included in it for connection to the E10A-USB.

Because the SH7086's H-UDI pins and AUD pins are being output to the extension connector, do not use the applicable pins of the extension connector when debugging with the H-UDI connector.

Figure2.10.1 shows the block diagram of E10A-USB interface.

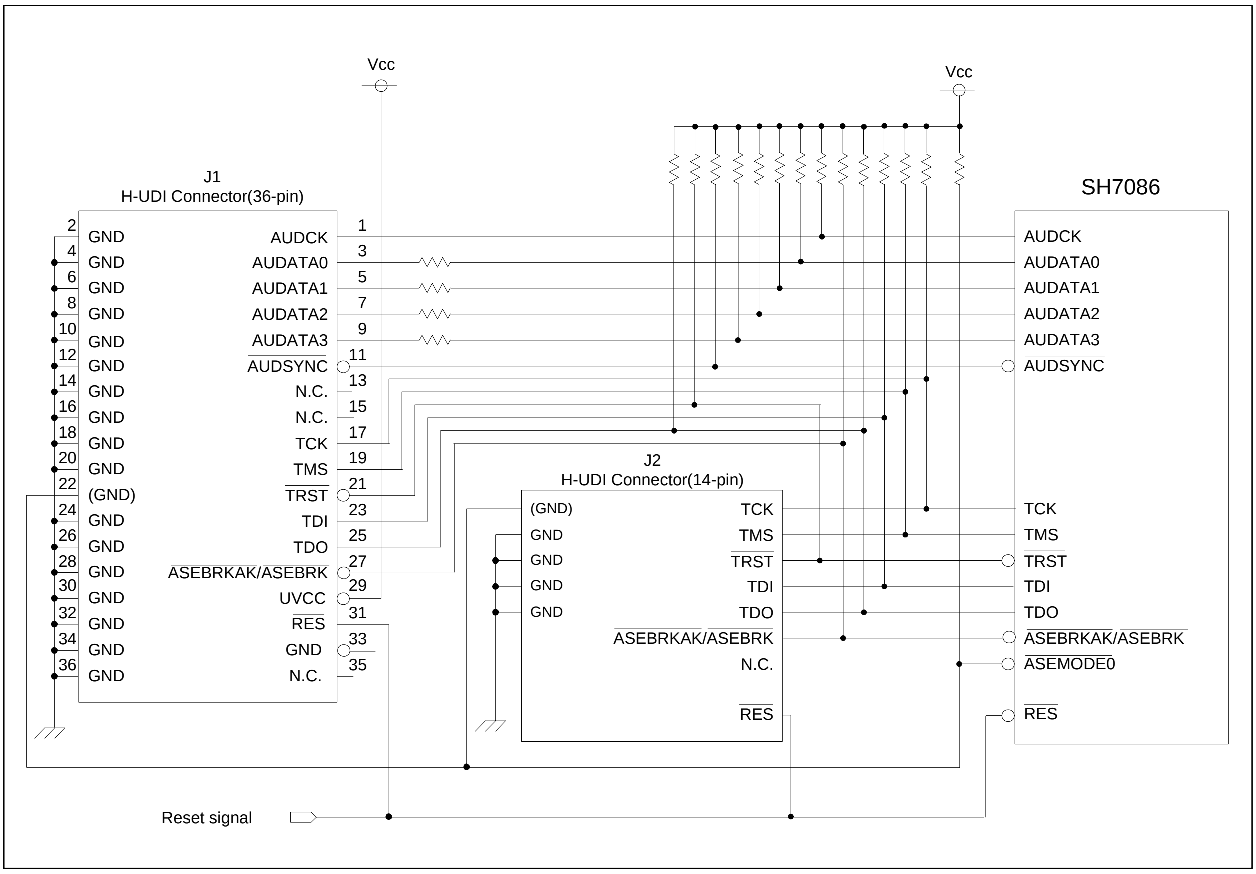


Figure2.10.1 Block Diagram of E10A-USB Interface

Note: 36-pin type and 14 pin type of the H-UDI connector cannot be used at the same time.

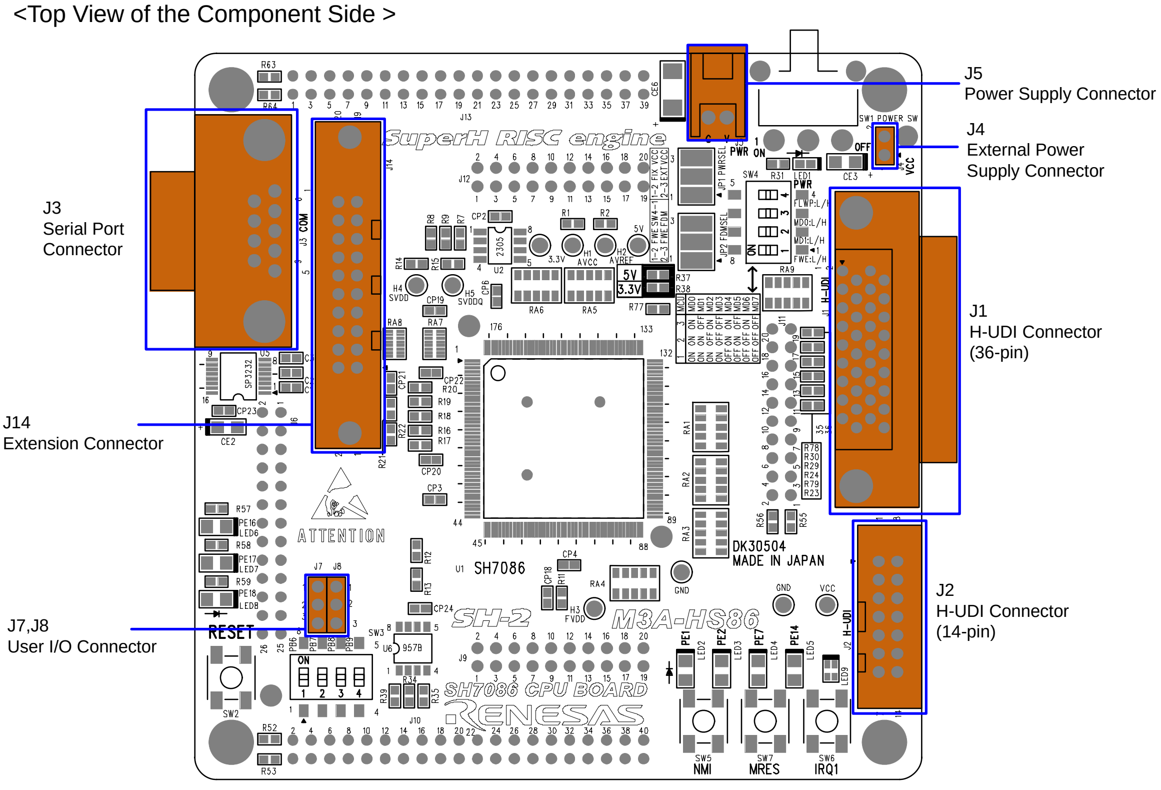
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Chapter 3

Operational Specifications

3.1 M3A-HS86 Connectors Outline

Figure3.1.1 shows M3A-HS86 connector assignments.



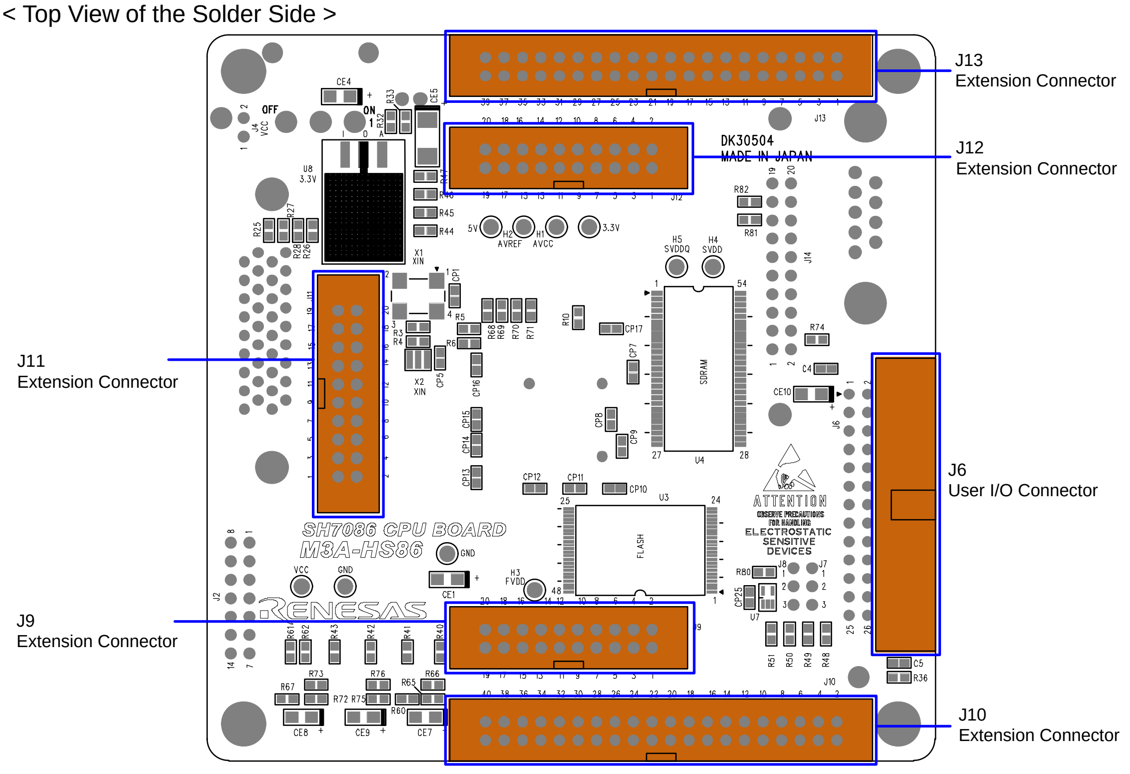


Figure3.1.1 M3A-HS86 Connector Assignments

3.1.1 H-UDI Connector (J1,J2)

M3A-HS86 has the 36-pin H-UDI (J1) connector and 14-pin H-UDI (J2) connector included in it for connection to the E10A-USB emulator.

Figure3.1.2 shows a pin assignment of H-UDI (J1) connector.

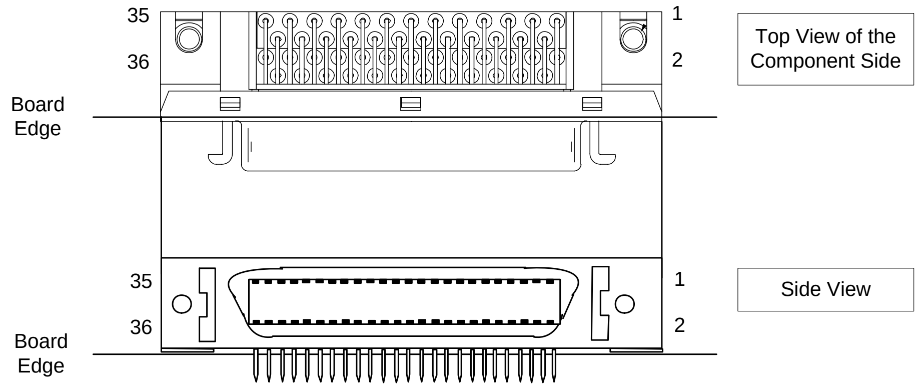


Figure3.1.2 Pin Assignment of H-UDI (J1) Connector

Table3.1.1 lists pin assignments of H-UDI connector.

Table3.1.1 Pin Assignments of H-UDI (J1) Connector

Pin	Signal Name	Pin	Signal Name
1	AUDCK	19	TMS
2	GND	20	GND
3	AUDATA0	21	$\overline{\text{TRST}}$
4	GND	22	(GND)
5	AUDATA1	23	TDI
6	GND	24	GND
7	AUDATA2	25	TDO
8	GND	26	GND
9	AUDATA3	27	$\overline{\text{ASEBRKAK}}/\overline{\text{ASEBRK}}$
10	GND	28	GND
11	$\overline{\text{AUDSYNC}}$	29	UVCC
12	GND	30	GND
13	NC	31	$\overline{\text{RES}}$
14	GND	32	GND
15	NC	33	GND
16	GND	34	GND
17	TCK	35	NC
18	GND	36	GND

Figure3.1.3 shows a pin assignment of H-UDI (J2) connector.

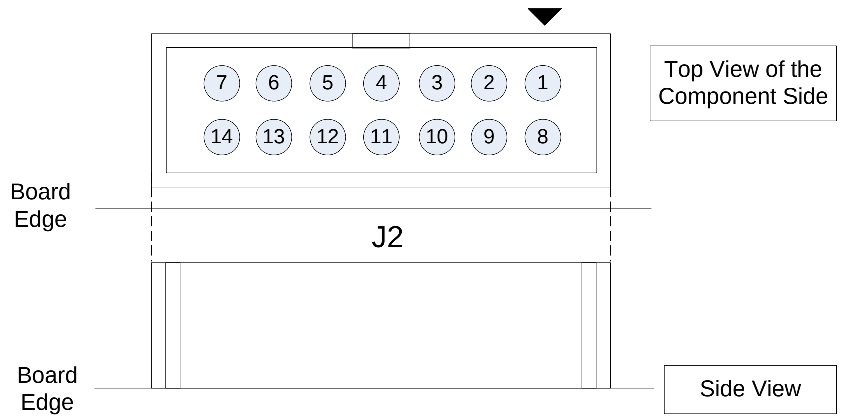


Figure3.1.3 Pin Assignment of H-UDI (J2) Connector

Table3.1.2 lists pin assignments of H-UDI (J2) connector.

Table3.1.2 Pin Assignments of H-UDI (J2) Connector

Pin	Signal Name	Pin	Signal Name
1	TCK	8	NC
2	$\overline{\text{TRST}}$	9	(GND)
3	TDO	10	GND
4	$\overline{\text{ASEBRKAK}}$/$\overline{\text{ASEBRK}}$	11	UVCC
5	TMS	12	GND
6	TDI	13	GND
7	$\overline{\text{RES}}$	14	GND

3.1.2 Serial Port Connector (J3)

The M3A-HS86 includes a serial port connector (J3) for serial communication.

Figure3.1.4 shows a pin assignment of serial port connector.

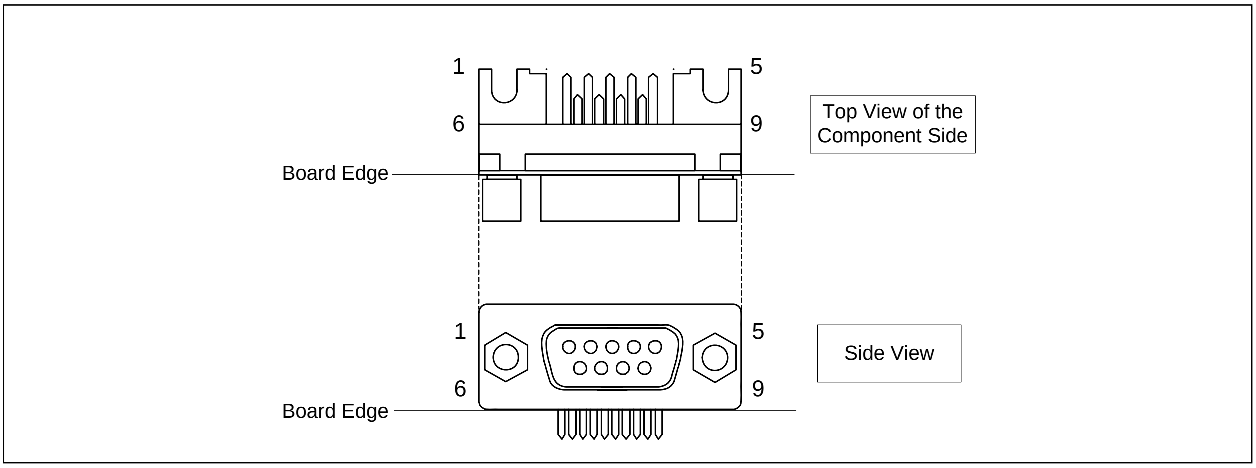


Figure3.1.4 Pin Assignment of Serial Port Connector (J3)

Table3.1.3 lists pin assignments of serial port connector.

Table3.1.3 Pin Assignments of Serial Port Connector (J3)

Pin	Signal Name	Pin	Signal Name
1	NC	6	$\overline{DSR}$
2	RXD	7	$\overline{RTS}$
3	TXD	8	$\overline{CTS}$
4	$\overline{DTR}$	9	NC
5	GND		

Pins 4-6 are loop back-connected. Pins 7-8 are loop back-connected.

3.1.3 External Power Supply Connectors for the SH7086 (J4)

The M3A-HS86 includes the external power supply connector pin for the SH7086.

Figure3.1.5 shows a pin assignment of power supply connector.

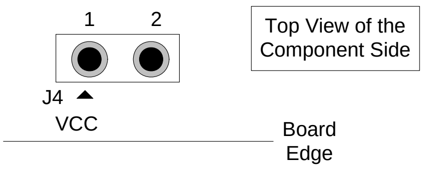


Figure3.1.5 Pin Assignment of Power Supply Connector (J4)

Table3.1.4 lists a pin assignment of power supply connector for the SH7086.

Table3.1.4 Pin Assignment of Power Supply Connector (J4)

Pin	Signal Name	Pin	Signal Name
1	+3.3V or +5.0V	2	GND

3.1.4 Power Supply Connector (J5)

The M3A-HS86 includes a power supply connector for the board itself.

Figure3.1.6 shows a pin assignment of power supply connector.

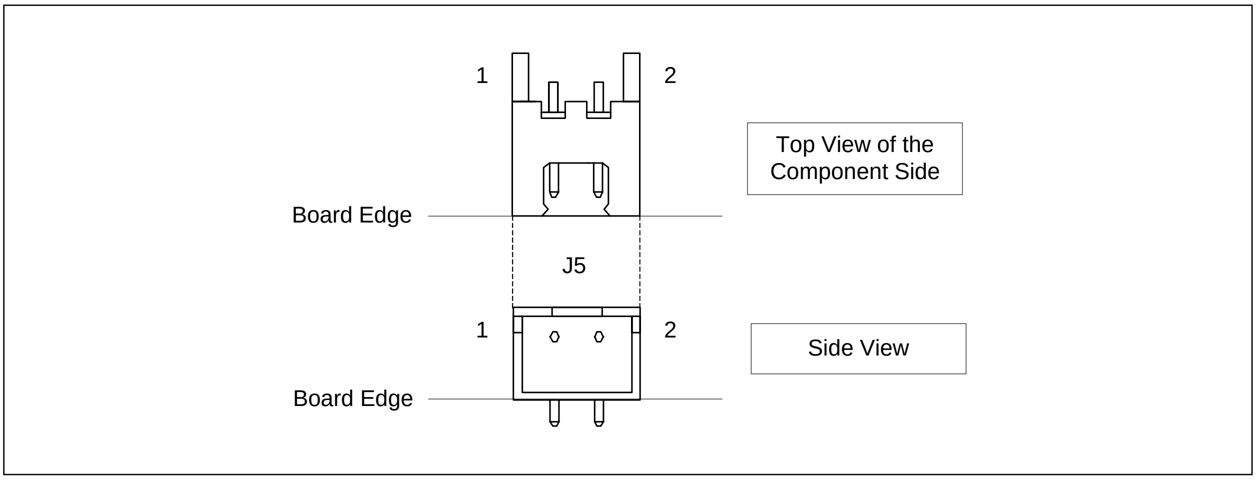


Figure3.1.6 Pin Assignment of Power Supply Connector (J5)

Table3.1.5 lists a pin assignment of power supply connector for the M3A-HS86.

Table3.1.5 Pin Assignment of Power Supply Connector (J5)

Pin	Signal Name	Pin	Signal Name
1	+5V	2	GND

3.1.5 User I/O Connector (J6-J8)

The M3A-HS86 includes user I/O connectors to which the internal peripheral function pins of the SH7086 applicable for motor control (e.g.,MTU2 and AD functions) are connected. Figure3.1.7 shows a pin assignment of each user I/O connector. Table3.1.6 lists pin assignments of user I/O connectors (J6).

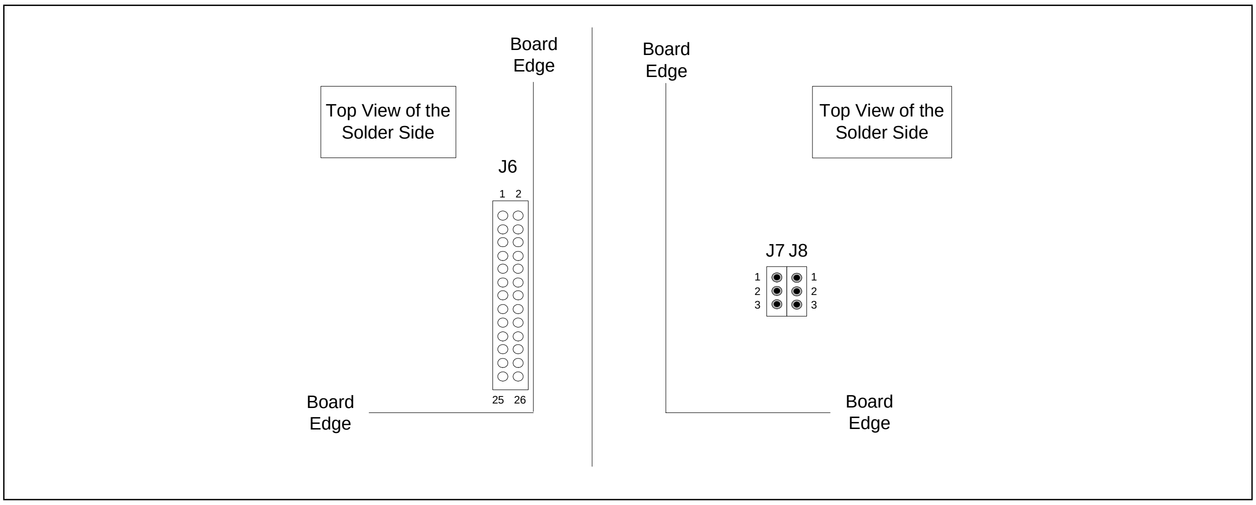


Figure3.1.7 Pin Assignment of User I/O Connectors (J6-J8)

Table3.1.6 Pin Assignments of User I/O Connector (J6)

Pin	Signal Name	Other Connection
1	+5V	-
2	GND	-
3	PF8/AN8	-
4	PA21/CS5/CE1A/CASU/TIC5U	Extension connector (J10)
5	PA22/WRHL/ICIORD/DQMUL/TIC5V	Extension connector (J11)
6	PA23/WRHH/ICIOWR/AH/DQMUU/TIC5W	Extension connector (J11)
7	PE16/CS8/TIOC3BS	Extension connector (J11), LED6
8	PE18/TIOC4AS	LED8
9	PE19/TIOC4BS	-
10	PE17/TIOC3DS	LED7
11	PE20/TIOC4CS	-
12	PE21/TIOC4DS	-
13	PA26/A26/IRQ0	Extension connector (J9)
14	PA27/A27/IRQ1	Extension connector (J9)
15	PA28/A28/IRQ2	Extension connector (J9)
16	PA29/A29/IRQ3	Extension connector (J9)
17	PF2/AN2	-
18	PF3/AN3	-
19	PF4/AN4	-
20	PF9/AN9	-
21	PB6/A18/BACK/IRQ4/RXD0	DIP switch (SW3)
22	PB7/A19/BREQ/IRQ5/TXD0	DIP switch (SW3)
23	PB8/A20/WAIT/IRQ6/SCK0	DIP switch (SW3)
24	PB9/A21/IRQ7/ADTRG/POE8	DIP switch (SW3)
25	PF1/AN1	-
26	PF7/AN7	-

Table3.1.7 lists pin assignments of user I/O connector (J7).

Table3.1.7 Pin Assignments of User I/O Connector (J7)

Pin	Signal Name	Other Connection
1	PD20/D20/IRQ4/TIC5WS	Extension connector (J13)
2	PD21/D21/IRQ5/TIC5VS	Extension connector (J13)
3	PD22/D22/IRQ6/TIC5US	Extension connector (J13)

Table3.1.8 lists pin assignments of user I/O connector (J8).

Table3.1.8 Pin Assignments of User I/O Connector (J8)

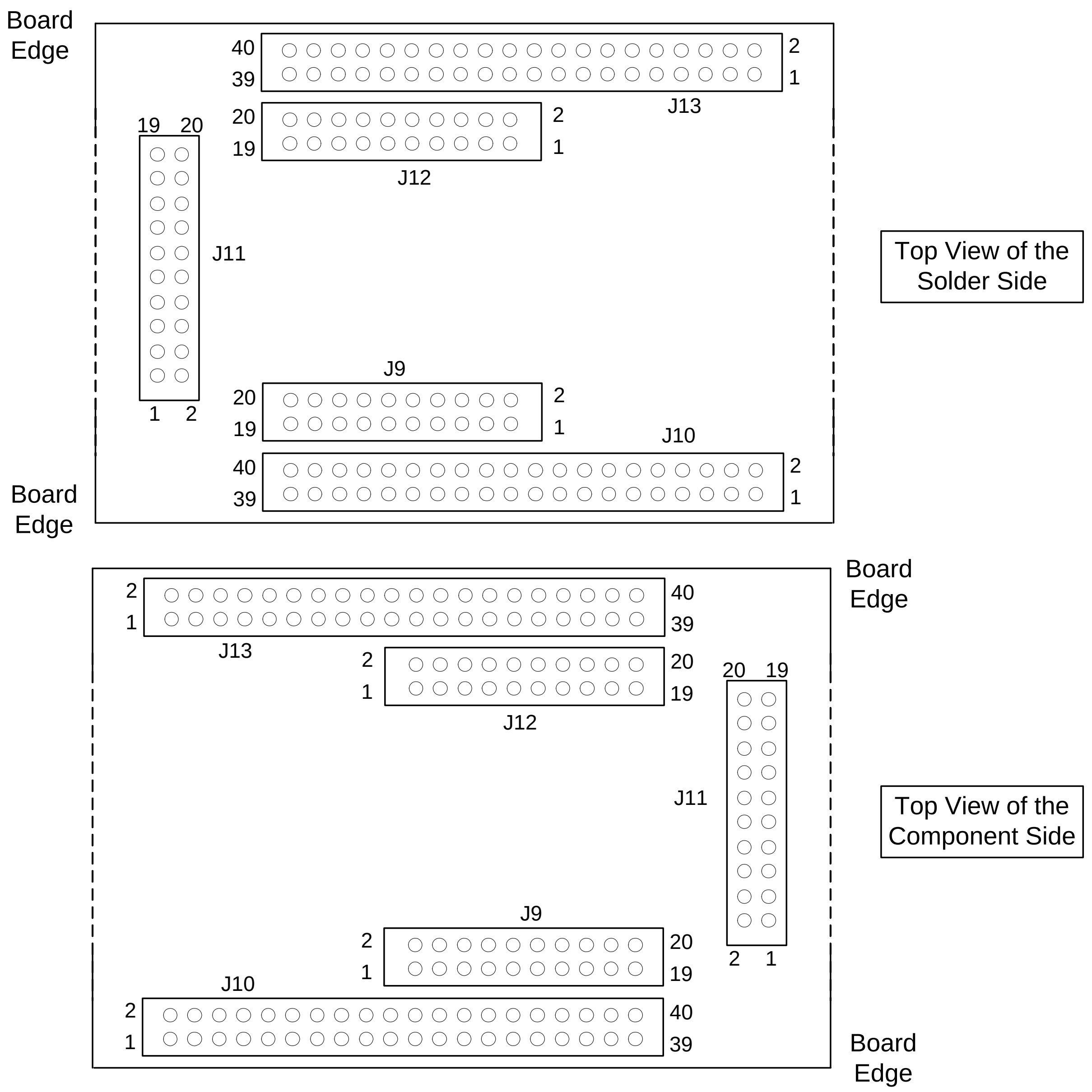
Pin	Signal Name	Other Connection
1	PF0/AN0	-
2	PF6/AN6	-
3	PF5/AN5	-

3.1.6 Extension Connectors (J9-J13)

The M3A-HS86 includes extension connectors to which the I/O pins of the SH7086 are connected.

MIL standard connectors can be connected to J9-J13, allowing the user to create extension board or monitor the SH7086 bus signals.

Figure3.1.8 shows a pin assignment of extension connector.



[Note]: The pin numbers on CPU board are defined based on that extension connectors are mounted on the component side. Thus, the pin assignments on the extension connector side and the CPU board side are different when mounting extension connectors on the solder side.

Figure3.1.8 Pin Assignment of Extension Connectors (J9-J13)

Table3.1.9 lists pin assignments of extension connector (J9).

Table3.1.9 Pin Assignments of Extension Connectors (J9)

Pin	Signal Name	Other Connection
1	NC	-
2	NC	-
3	NC	-
4	NC	-
5	PA0/RXD0/$\overline{CS4}$	-
6	PA1/TXD0/$\overline{CS5}$/$\overline{CE1A}$	-
7	PA2/A25/DREQ0/IRQ0/SCK0	-
8	PA5/A22/DREQ1/IRQ1/SCK1	IRQ switch (SW6)
9	PA6/$\overline{CS2}$/TCLKA	Extension connector (J10)
10	PA26/A26/IRQ0	User I/O connector (J6)
11	PA27/A27/IRQ1	User I/O connector (J6)
12	PA28/A28/IRQ2	User I/O connector (J6)
13	PA29/A29/IRQ3	User I/O connector (J6)
14	PF10/AN10	-
15	PF11/AN11	-
16	PF12/AN12	-
17	PF13/AN13	-
18	PF14/AN14	-
19	PF15/AN15	-
20	GND	-

Table3.1.10 lists pin assignments of extension connectors.

Table3.1.10 Pin Assignments of Extension Connectors (J10)

Pin	Signal Name	Other Connection
1	3.3V	-
2	3.3V	-
3	$\overline{\text{WDTOVF}}$	-
4	PC25/A25	-
5	PC24/A24	-
6	PC23/A23	-
7	PC22/A22	-
8	PC21/A21	Flash memory*2
9	PC20/A20	Flash memory*2
10	PC19/A19	Flash memory*2
11	PC18/A18	Flash memory*2
12	PB1/A17	Flash memory*2
13	PB0/A16	Flash memory*2
14	PC15/A15	Flash memory*2
15	PC14/A14	SDRAM*1, Flash memory*2
16	PC13/A13	SDRAM*1, Flash memory*2
17	PC12/A12	SDRAM*1, Flash memory*2
18	PC11/A11	SDRAM*1, Flash memory*2
19	PC10/A10	SDRAM*1, Flash memory*2
20	GND	-
21	NC	-
22	NC	-
23	PA15/CK (EXCLK)	Extension connector (J12), SDRAM*1, Clock buffer*2
24	PC9/A9	SDRAM*1, Flash memory*2
25	PC8/A8	SDRAM*1, Flash memory*2
26	PC7/A7	SDRAM*1, Flash memory*2
27	PC6/A6	SDRAM*1, Flash memory*2
28	PC5/A5	SDRAM*1, Flash memory*2
29	PC4/A4	SDRAM*1, Flash memory*2
30	PC3/A3	SDRAM*1, Flash memory*2
31	PC2/A2	SDRAM*1, Flash memory*2
32	PC1/A1	SDRAM*1, Flash memory*2
33	PC0/A0	-
34	PA10/$\overline{\text{CS0}}$/$\overline{\text{POE4}}$	Flash memory*2
35	PA11/$\overline{\text{CS1}}$/$\overline{\text{POE5}}$	-
36	PA6/$\overline{\text{CS2}}$/TCLKA	Extension connector (J9)
37	PA20/$\overline{\text{CS4}}$/$\overline{\text{RASU}}$	-
38	PA21/$\overline{\text{CS5}}$/$\overline{\text{CASU}}$/$\overline{\text{CE1A}}$/TIC5U	User I/O connector (J6)
39	$\overline{\text{RES}}$	Reset module, Flash memory*2
40	GND	-

Notes *1: M3A-HS86 (3.3V version) only.

*2: Not mounted.

Table3.1.11 lists pin assignments of extension connectors.

Table3.1.11 Pin Assignments of Extension Connectors (J11)

Pin	Signal Name	Other Connection
1	PB2/IRQ0/POE0/SCL	-
2	PB3/IRQ1/POE1/SDA	-
3	PA7/CS3/TCLKB	SDRAM*1
4	PA8/RDWR/IRQ2/TCLKC	SDRAM*1
5	PA12/WRL/DQMLL/POE6	SDRAM*1, Flash memory*2
6	PA13/WRH/DQMLU/WE/POE7	SDRAM*1
7	PA22/WRHL/ICIORD/DQMUL/TIC5V	User I/O connector (J6)
8	PA23/WRHH/ICIOWR/AH/DQMUU/TIC5W	User I/O connector (J6)
9	PA9/FRAME/CKE/IRQ3/TCLKD	SDRAM*1
10	PB4/RASL/IRQ2/POE2	SDRAM*1
11	PB5/CASL/IRQ3/POE3	SDRAM*1
12	PE16/CS8/TIOC3BS	User I/O connector (J6), LED6
13	PE8/SCK2/TIOC3A/SSCK/TMS	H-UDI connector (J1,J2)
14	PE10/TXD2/TIOC3C/SSO/TDI	H-UDI connector (J1,J2)
15	PE7/RXD2/BS/TIOC2B/UBCTRG/SSI	Extension connector (J12), LED4
16	PA24/CE2A/DREQ3	-
17	PA25/CE2B/DACK3/POE8	-
18	PA18/BREQ/TEND0	-
19	PA19/BACK/TEND1	-
20	GND	-

Notes *1: M3A-HS86 (3.3V version) only.
*2: Not mounted.

Table3.1.12 lists pin assignments of extension connectors.

Table3.1.12 Pin Assignments of Extension Connectors (J12)

Pin	Signal Name	Other Connection
1	NC	-
2	NC	-
3	NC	-
4	NC	-
5	NC	-
6	PE0/DREQ0/TIOC0A/AUDCK	H-UDI connector (J1)
7	NC (PE3/TEND1/TIOC0D/AUDATA3 when R68 mounted)	H-UDI connector (J1)
8	NC (PE4/IOIS16/TIOC1A/RXD3/AUDATA2 when R69 mounted)	H-UDI connector (J1)
9	NC (PE5/CS6/CE1B/TIOC1B/TXD3/AUDATA1(when R70 mounted)	H-UDI connector (J1)
10	NC (PE6/CS7/TIOC2A/SCK3/AUDATA0 when R71 mounted)	H-UDI connector (J1)
11	PE7/RXD2/BS/TIOC2B/UBCTRG/SSI	Extension connector (J11), LED4
12	PE9/TIOC3B/SCK3/RTS3/TRST	H-UDI connector (J1,J2)
13	PE11/TIOC3D/RXD3/CTS3/TDO	H-UDI connector (J1,J2)
14	PE12/TIOC4A/TXD3/SCS/TCK	H-UDI connector (J1,J2)
15	PE13/TIOC4B/MRES/ASEBRKAK/ASEBRK	H-UDI connector (J1,J2), MRES switch*2
16	PE14/WRHH/ICIOWR/AH/DQMUU/DACK0/TIOC4C	LED5
17	PE15/CKE/DACK1/TIOC4D/IRQOUT	-
18	PA15/CK	Extension connector (J12), SDRAM*1, Clock buffer*2
19	PA16/WRHH/ICIOWR/AH/DQMUU/CKE/DREQ2/AUDSYNC	H-UDI connector (J1)
20	GND	-

Notes *1: M3A-HS86 (3.3V version) only.

*2: Not mounted.

Table3.1.13 lists pin assignments of the extension connectors.

Table3.1.13 Pin Assignments of the Extension Connectors (J13)

Pin	Signal Name	Other Connection
1	5V	-
2	5V	-
3	PA17/$\overline{\text{WAIT}}$/DACK2	-
4	PD31/D31/TIOC3AS/$\overline{\text{ADTRG}}$	-
5	PD30/D30/TIOC3CS/$\overline{\text{IRQOUT}}$	-
6	PD29/D29/$\overline{\text{CS3}}$/TIOC3BS	-
7	PD28/D28/$\overline{\text{CS2}}$/TIOC3DS	-
8	PD27/D27/DACK1/TIOC4AS	-
9	PD26/D26/DACK0/TIOC4BS	-
10	PD25/D25/DREQ1/TIOC4CS	-
11	PD24/D24/DREQ0/TIOC4DS	-
12	PD23/D23/IRQ7/$\overline{\text{AUDSYNC}}$	-
13	PD22/D22/IRQ6/TIC5US/AUDCK	Extension connector (J7)
14	PD21/D21/IRQ5/TIC5VS	Extension connector (J7)
15	PD20/D20/IRQ4/TIC5WS	Extension connector (J7)
16	PD19/D19/IRQ3/$\overline{\text{POE7}}$/AUDATA3	-
17	PD18/D18/IRQ2/$\overline{\text{POE6}}$/AUDATA2	-
18	PD17/D17/IRQ1/$\overline{\text{POE5}}$/AUDATA1	-
19	PD16/D16/IRQ0/$\overline{\text{POE4}}$/AUDATA0	-
20	GND	-
21	PE2/DREQ1/TIOC0C	LED3
22	PE1/TEND0/TIOC0B	LED2
23	PA14/$\overline{\text{RD}}$	Flash memory[*2]
24	PD15/D15/TIOC4DS	SDRAM[*1],'Flash memory[*2]
25	PD14/D14/TIOC4CS	SDRAM[*1], Flash memory[*2]
26	PD13/D13/TIOC4BS	SDRAM[*1], Flash memory[*2]
27	PD12/D12/TIOC4AS	SDRAM[*1], Flash memory[*2]
28	PD11/D11/TIOC3DS	SDRAM[*1], Flash memory[*2]
29	PD10/D10/TIOC3CS	SDRAM[*1], Flash memory[*2]
30	PD9/D9/TIOC3BS	SDRAM[*1], Flash memory[*2]
31	PD8/D8/TIOC3AS	SDRAM[*1], Flash memory[*2]
32	PD7/D7/TIC5WS	SDRAM[*1], Flash memory[*2]
33	PD6/D6/TIC5VS	SDRAM[*1], Flash memory[*2]
34	PD5/D5/TIC5US	SDRAM[*1], Flash memory[*2]
35	PD4/D4/TIC5W	SDRAM[*1], Flash memory[*2]
36	PD3/D3/TIC5V	SDRAM[*1], Flash memory[*2]
37	PD2/D2/TIC5U	SDRAM[*1], Flash memory[*2]
38	PD1/D1	SDRAM[*1], Flash memory[*2]
39	PD0/D0	SDRAM[*1], Flash memory[*2]
40	GND	-

Notes *1: M3A-HS86 (3.3V Version) only.

*2: Not mounted.

3.1.7 Extension Connector (J14)

Extension connector(J14) connects the pins necessary for writing a on-chip flash memory of SH7086. Figure 3.1.9 lists pin assignments of the extension connectors.

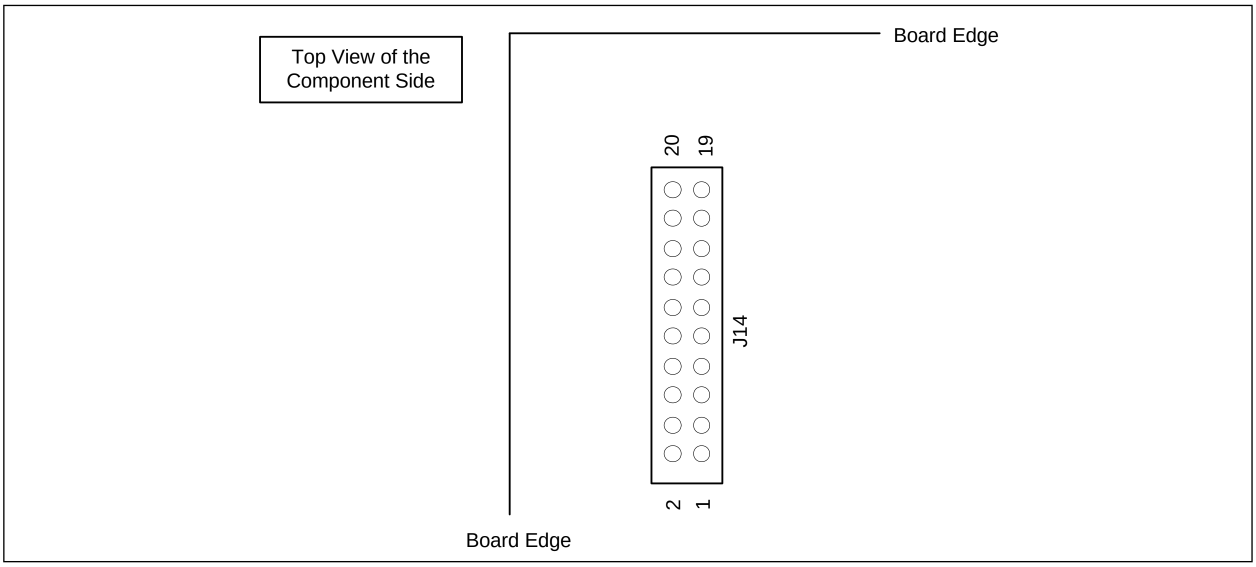


Figure 3.1.9 Pin Assignments of the Extension Connector (J14)

Table 3.1.14 lists pin assignments of the extension connector (J14).

Table 3.1.14 Pin Assignments of the Extension Connector (J14)

Pin	Signal Name	Other Connection
1	$\overline{\text{RES}}$	-
2	GND	-
3	FWE	FWE pin select jumper (JP2)
4	GND	-
5	MD0	DIP switch for system setting (SW4-3)
6	GND	-
7	MD1	DIP switch for system setting (SW4-2)
8	GND	-
9	NC	-
10	GND	-
11	NC	-
12	GND	-
13	NC	-
14	GND	-
15	PA4/A23/TXD1	Serial port connector (J3)
16	GND	-
17	PA3/A24/RXD1	Serial port connector (J3)*
18	VCC	-
19	NC	-
20	VCC	-

Note *: It is connected to the output pin of RS-232C driver.

3.2 Outline of Switches and LEDs

The M3A-HS86 includes switches and LEDs as its operational components.

Figure3.2.1 shows the M3A-HS86 operational component assignment.

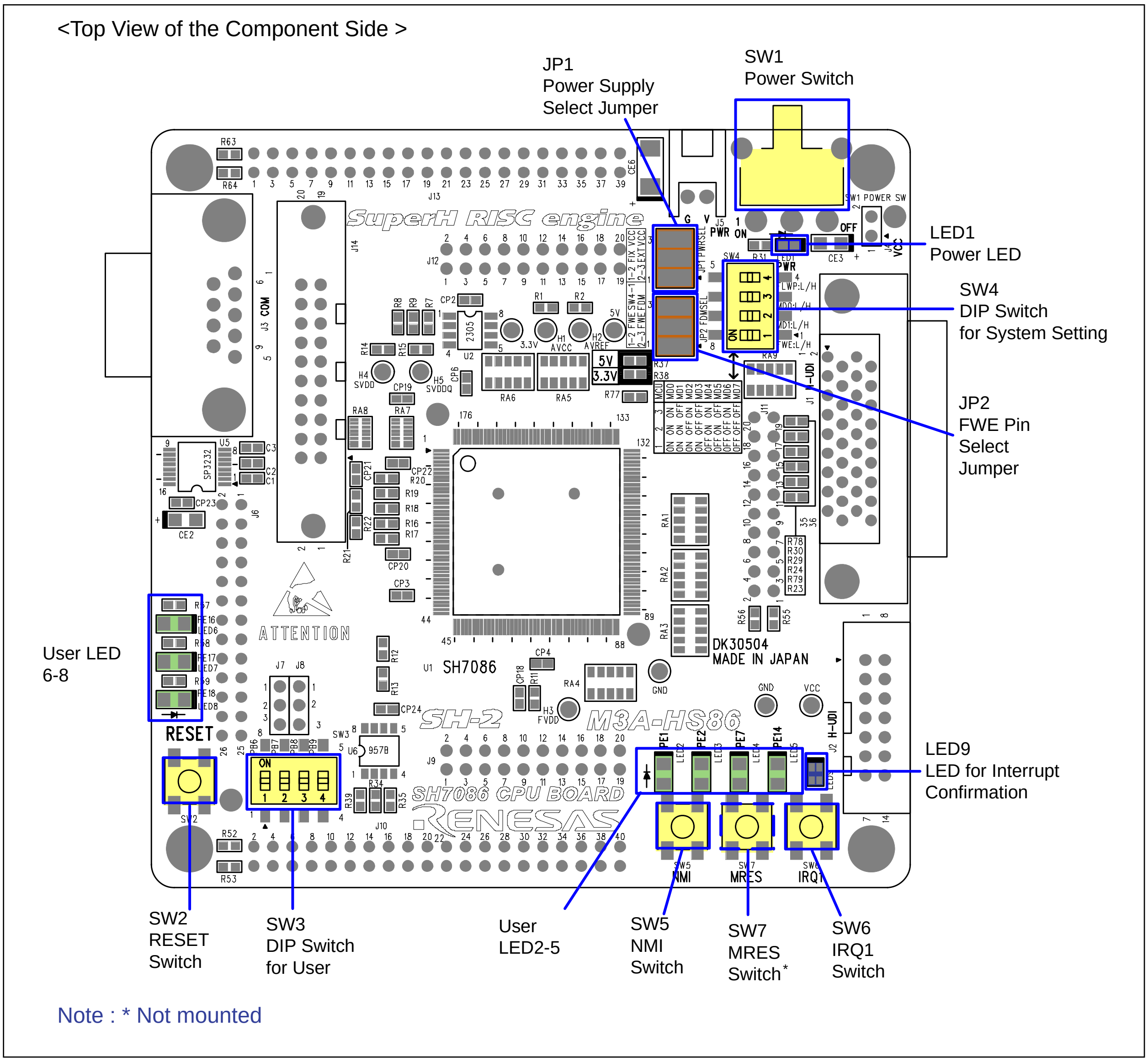


Figure3.2.1 M3A-H86 Operational Component Assignment

3.2.1 SH7086 Power Supply Select Jumpers (JP1)

The JP1 allow the sources for the SH7086 power supply voltages to be selected.

Figure3.2.2 shows the SH7086 power supply voltage select jumper assignment (JP1). Table3.2.1 lists the jumper setting for selecting SH7086 Power Supply Voltage (JP1).

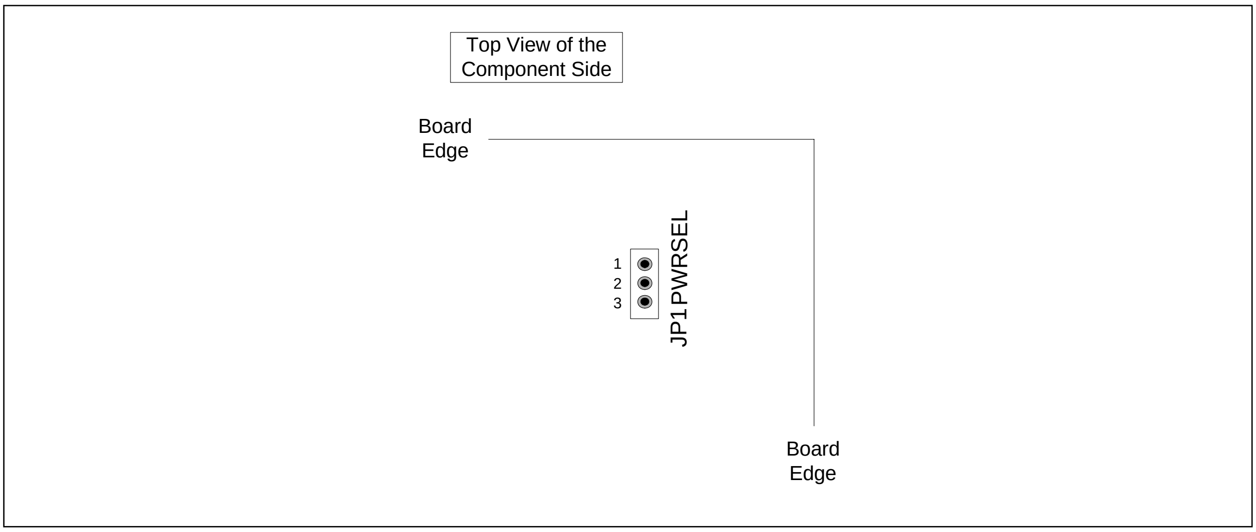


Figure3.2.2 SH7086 Power Supply Voltage Select Jumpers Assignment (JP1)

Table3.2.1 Jumper Setting for Selecting SH7086 Power Supply Voltage (JP1)

Jumper	Setting	Function
JP1 PWRSEL	1 - 2	5V fixed power supply voltage (supplied from J5)
	2 - 3	External power supply voltage (supplied from J4)

: Initial Setting

Note: Do not change jumper settings during the operation of M3A-HS86. Ensure to turn off the power for the M3A-HS86 before changing jumper settings.

3.2.2 FWE Pin Select Jumper (JP2)

The JP2 allows the connection for the FWE pin to be selected.

Figure3.2.3 shows FWE pin select jumper (JP2) assignment. Table3.2.2 lists jumper setting for selecting FWE pin (JP2).

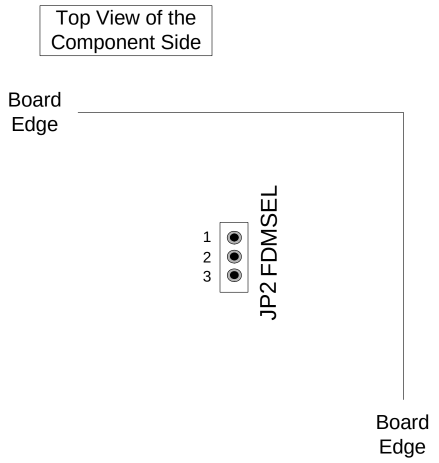


Figure3.2.3 FWE Pin Select Jumper (JP2) Assignment

Table3.2.2 Jumper Setting FWE Pin (JP2)

Jumper	Setting	Function
JP2 FDMSEL	1 - 2	The FWE pin of SH7086 is connected with SW4-1.
	2 - 3	The FWE pin of SH7086 is connected with J14 connector.

: Initial Setting

Note: Do not change jumper settings during the operation of M3A-HS86. Ensure to turn off the power for the M3A-HS86 before changing jumper settings.

3.2.3 Switch and LED Functions

The M3A-HS86 includes six switches and nine LEDs. The MRES switch can be mounted as the option. However, $\overline{\text{MRES}}$ pin is multiplexed with $\overline{\text{ASEBRKAK}}/\overline{\text{ASEBRK}}$ pin, so do not mount the switch MRES when H-UDI connectors (J1, J2) are used. Figure3.2.4 shows the switch and LED pin layout on M3A-HS86 board. Table3.2.3 lists switches mounted on M3A-HS86.

<Top View of the Component Side >

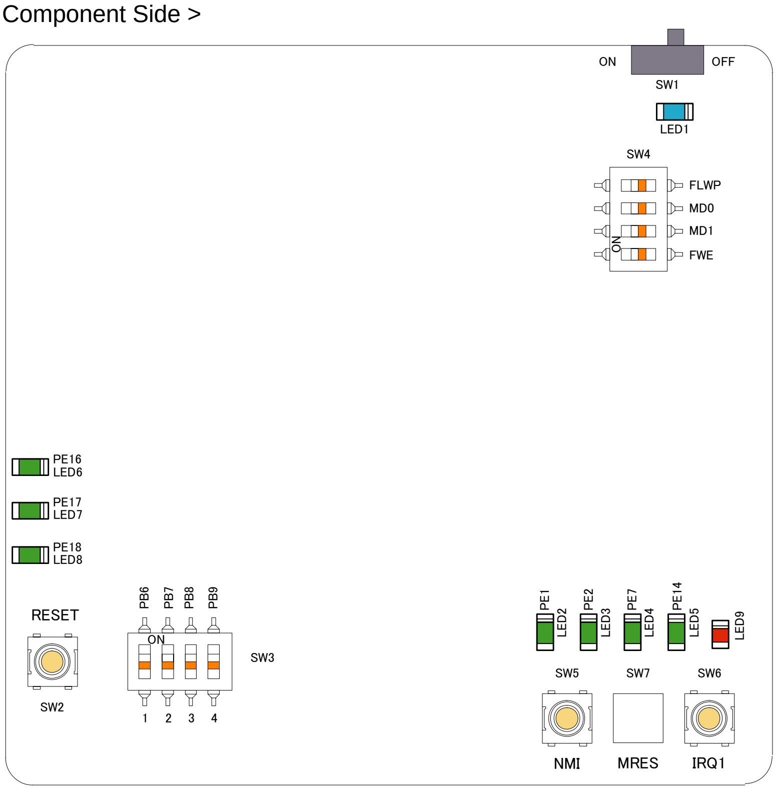


Figure3.2.4 Switch and LED Pin Assignment on M3A-HS86 Board

Table3.2.3 Switches Mounted on M3A-HS86

No.	Function	Remarks
SW1	System power on/off switch	-
SW2	System reset input switch	See section 2.8 for details.
SW3	DIP switch open to the user (4-pole) SW3-1 OFF : PB6=H, ON : PB6=L SW3-2 OFF : PB7=H, ON : PB7=L SW3-3 OFF : PB8=H, ON : PB8=L SW3-4 OFF : PB9=H, ON : PB9=L	PB6, PB7, PB8 and PB9 are pulled up. See section 2.5 on chapter 2 for details.
SW4	System setup DIP switch (4-pole)	See Table3.2.4 for the functions
SW5	NMI input switch	See section 2.9 of chapter 2 for details.
SW6	IRQ1 input switch	See section 2.9 of chapter 2 for details.
SW7	MRES* input switch	Not mounted.

*: By MRES (manual reset), each register of the on-chip peripheral module is not initialized though an internal state of CPU is initialized.

Table3.2.4 lists functions of switch SW4. SH7086 operating mode is determined by the combination of the MD0, MD1 and FWE pins. Table3.2.5 lists the selection of SH7086 operating modes.

Table3.2.4 Functions of Switch SW4

No.	Setting	Function	
SW4-1 FWE	OFF	FWE=H (Releasing the writing/erasing protects of on-chip flash memory)	MCU operating mode setting (See.Table3.2.5)
	ON	FWE=L (Setting the writing erasing protects of on-chip flash memory)	
SW4-2 MD1	OFF	MD1 pin state “H”	
	ON	MD1 pin state “L”	
SW4-3 MD0	OFF	MD0 pin state “H”	
	ON	MD0 pin state “L”	
SW4-4 FLASH Lock	OFF	Releasing the write protect in the on-chip flash memory (WP#pin is “H”)	
	ON	Setting the write protect in the on-chip flash memory (WP#pin is “L”)	

: Initial Setting

Table3.2.5 Selection of SH7086 Operating Mode

SW4-1 (FWE)	SW4-2 (MD1)	SW4-3 (MD0)	SH7086 Operating Mode	
			Operating Mode	Mode Name
ON	ON	ON	Mode0	MCU extension mode0 (On-chip ROM not active, CSO space:16bit bus)
ON	ON	OFF	Mode1	MCU extension mode1 (On-chip ROM not active, CSO space:32bit bus))
ON	OFF	ON	Mode2	MCU extension mode2 (On-chip ROM active)
ON	OFF	OFF	Mode3	Single chip mode (On-chip ROM active)
OFF	ON	ON	Mode4	Boot mode (On-chip ROM active)
OFF	ON	OFF	Mode5	User boot mode (On-chip ROM active)
OFF	OFF	ON	Mode6	User programming mode (On-chip ROM active)
OFF	OFF	OFF	Mode7	User programming mode (On-chip ROM active)

: Initial Setting

Table3.2.6 lists functions of LEDs mounted in M3A-HS86.

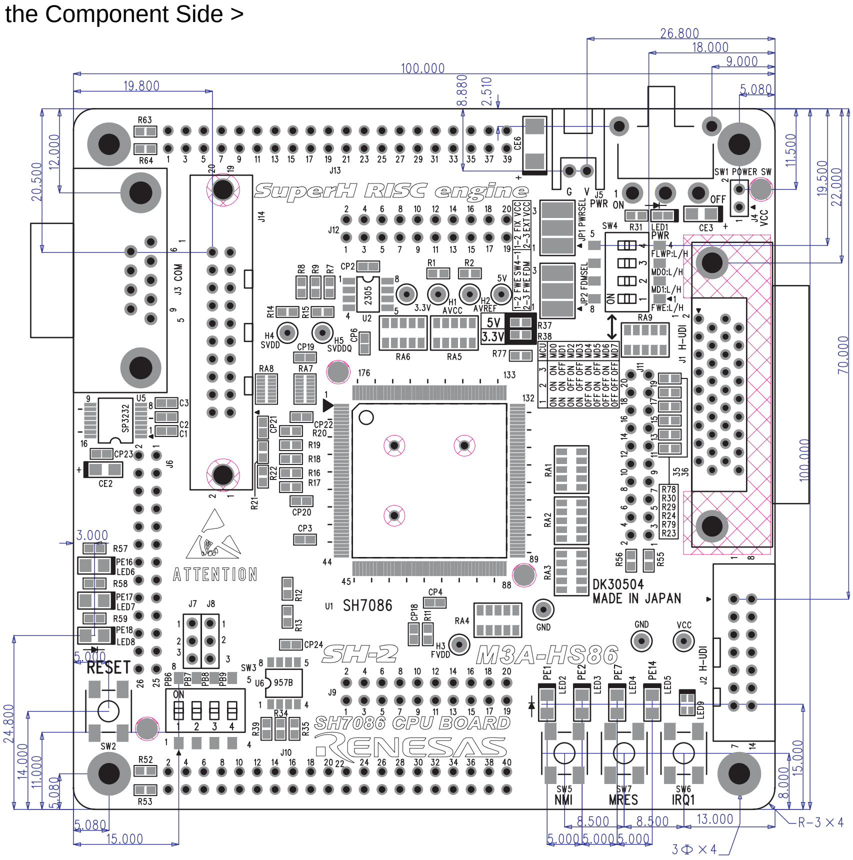
Table3.2.6 Functions of LEDs mounted in M3A-HS86

No.	Color	Functions/Remarks
LED1	Blue	Power-on LED (LED1 lights when power is supplied)
LED2	Green	Open to user (LED2 lights when PE1 outputs “L”)
LED3	Green	Open to user (LED3 lights when PE2 outputs “L”)
LED4	Green	Open to user (LED4 lights when PE7 outputs “L”)
LED5	Green	Open to user (LED5 lights when PE14 outputs “L”)
LED6	Green	Open to user (LED6 lights when PE16 outputs “L”)
LED7	Green	Open to user (LED7 lights when PE17 outputs “L”)
LED8	Green	Open to user (LED8 lights when PE18 outputs “L”)
LED9	Red	Interrupt confirmation (LED9 lights red when pushing NMI switch (SW5)).
	Yellow green	Interrupt confirmation (LED9 lights yellow green when pushing IRQ1 switch (SW6)).

3.3 Board Dimensions of M3A-HS86

Figure3.3.1 shows board dimensions of M3A-HS86.

<Top View of the Component Side >



< Top View of the Solder Side >

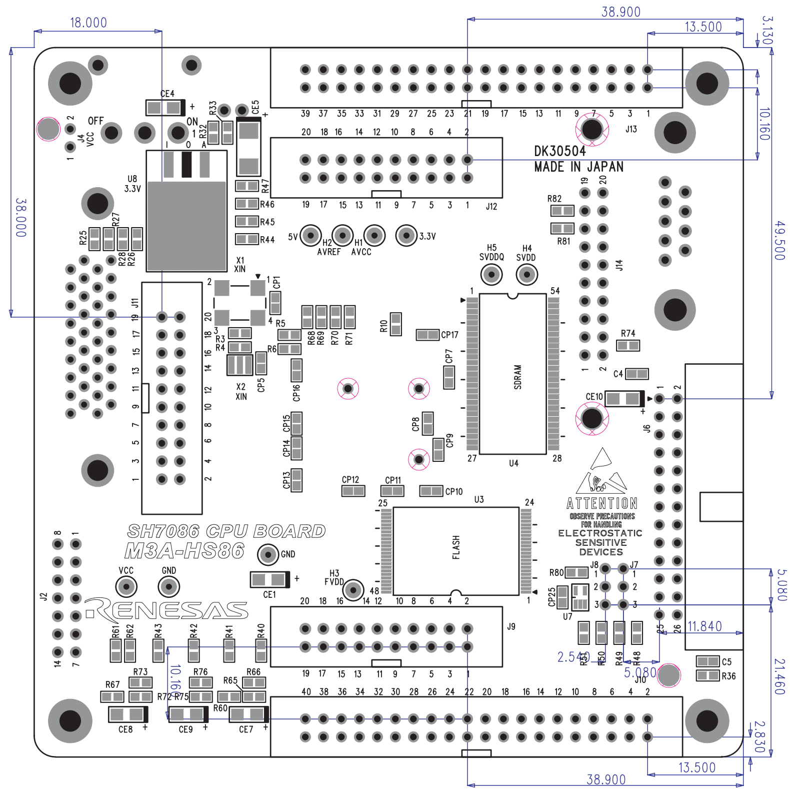


Figure3.3.1 Board Dimensions of M3A-HS86

Appendix

M3A-HS86 SCHEMATICS

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SH7086 CPU BOARD M3A-HS86 SCHEMATICS

Note:

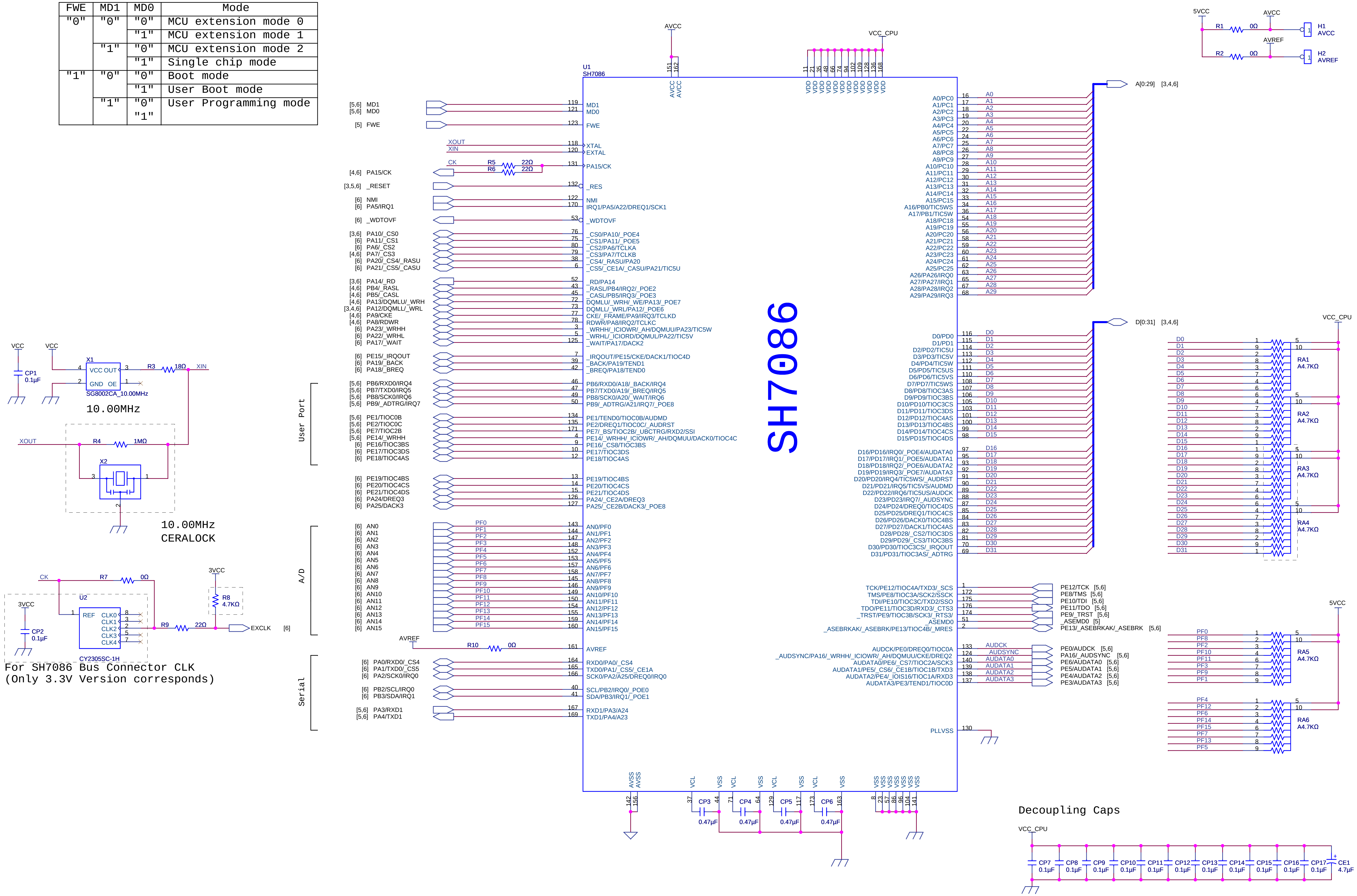
5VCC = 5V
3VCC = 3.3V
VCC = 3.3V(M3A-HS86G50,M3A-HS86G51)
5V(M3A-HS86G55,M3A-HS86G56)

R = Fixed Resistors
RA = Resistor Array
C = Ceramic Caps
CE = Tantalum Electrolytic Caps
CP = Decoupling Caps

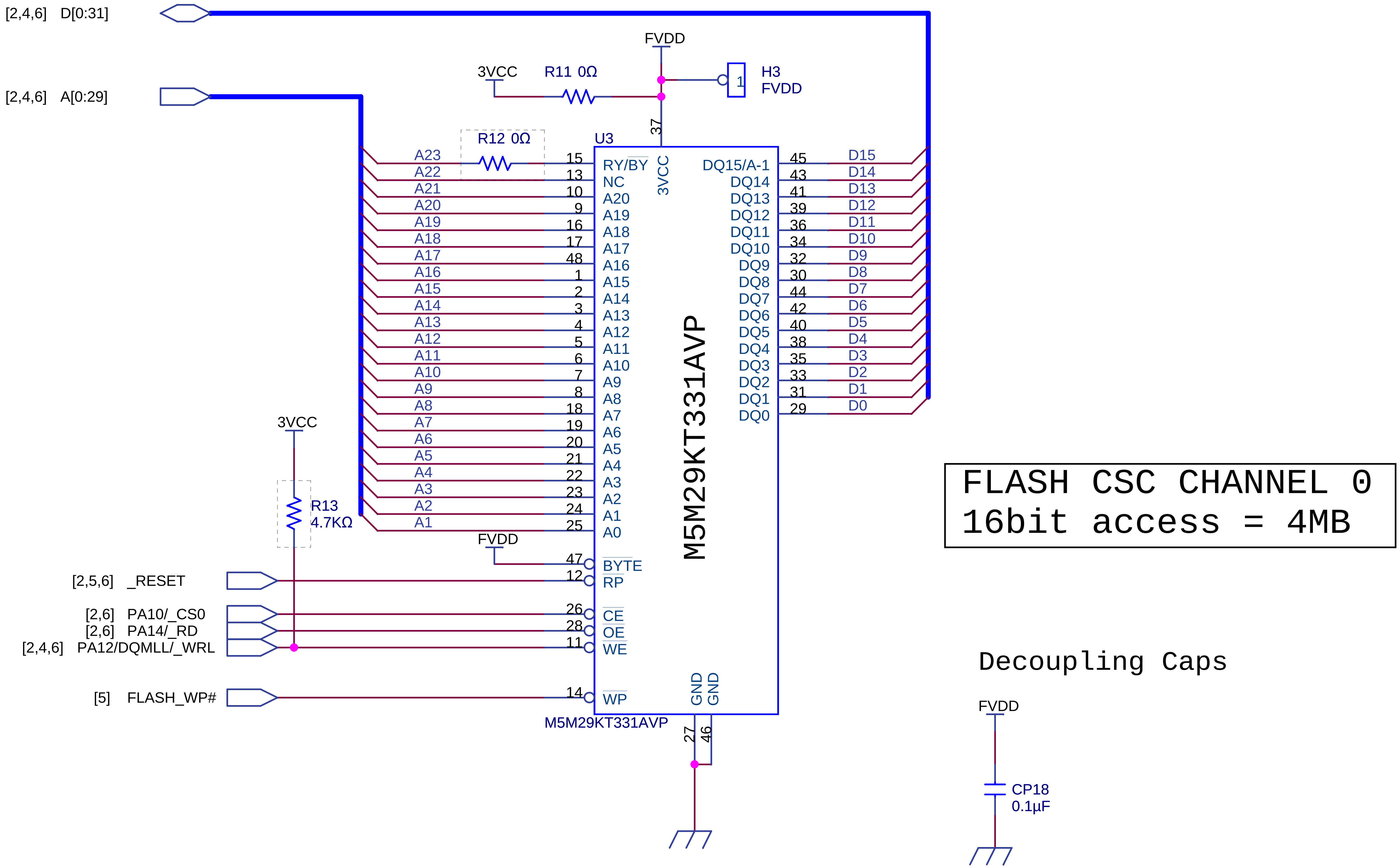
[Note] :not mounted

CHANGE	Ver. 1.0	SCALE		RENESAS SOLUTIONS CORPORATION				M3A-HS86
				DRAWN	CHECKED	DESIGNED	APPROVED	INDEX (1 / 7)
		DATE	07-01-18					DK30504

FWE	MD1	MD0	Mode
"0"	"0"	"0"	MCU extension mode 0
		"1"	MCU extension mode 1
	"1"	"0"	MCU extension mode 2
		"1"	Single chip mode
"1"	"0"	"0"	Boot mode
		"1"	User Boot mode
	"1"	"0"	User Programming mode
		"1"	

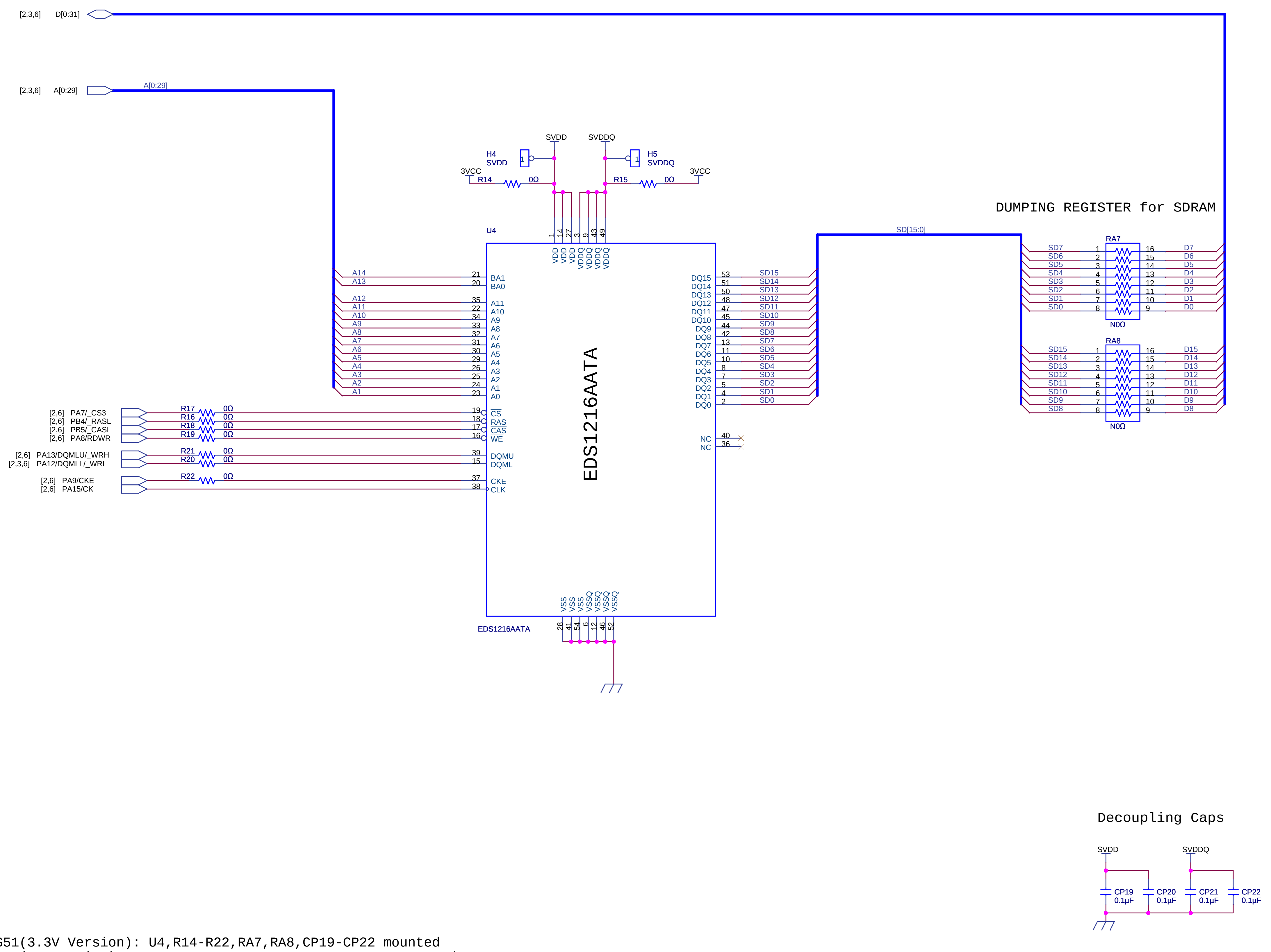


CHANGE	Ver. 1.0	SCALE	DATE 07-01-18	RENESAS SOLUTIONS CORPORATION	M3A-HS86
				DRAWN / CHECKED / DESIGNED / APPROVED	CPU SH7086 (2 / 7)
					DK30504



[Note]
M3A-HS86G50,M3A-HS86G51(3.3V Version): U3,R12,R13 not mounted
M3A-HS86G55,M3A-HS86G56(5V Version): U3,R11,R12,R13,CP18 not mounted

CHANGE			RENESAS SOLUTIONS CORPORATION				M3A-HS86
		SCALE	DRAWN	CHECKED	DESIGNED	APPROVED	FLASH MEMORY (3 / 7)
	Ver. 1.0	DATE 07-01-18					DK30504



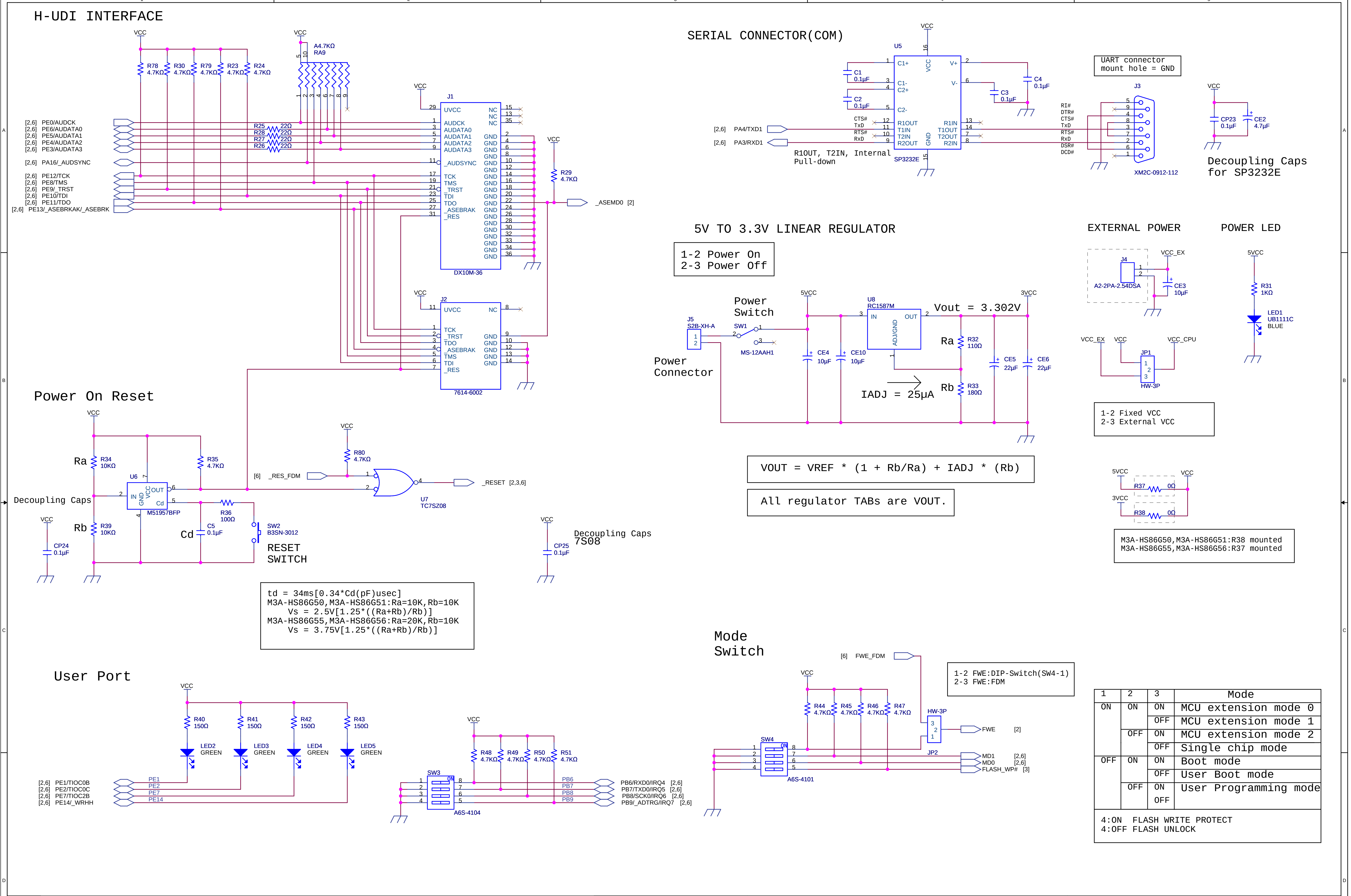
[Note]
M3A-HS86G50,M3A-HS86G51(3.3V Version): U4,R14-R22,RA7,RA8,CP19-CP22 mounted
M3A-HS86G55,M3A-HS86G56(5V Version): U4,R14-R22,RA7,RA8,CP19-CP22 not mounted

CHANGE	Ver. 1.0	SCALE		DATE	07-01-18

RENESAS SOLUTIONS CORPORATION

DRAWN	CHECKED	DESIGNED	APPROVED

M3A-HS86
SDRAM
(4 / 7)
DK30504



1	2	3	Mode
ON	ON	ON	MCU extension mode 0
		OFF	MCU extension mode 1
	OFF	ON	MCU extension mode 2
		OFF	Single chip mode
OFF	ON	ON	Boot mode
		OFF	User Boot mode
	OFF	ON	User Programming mode
		OFF	

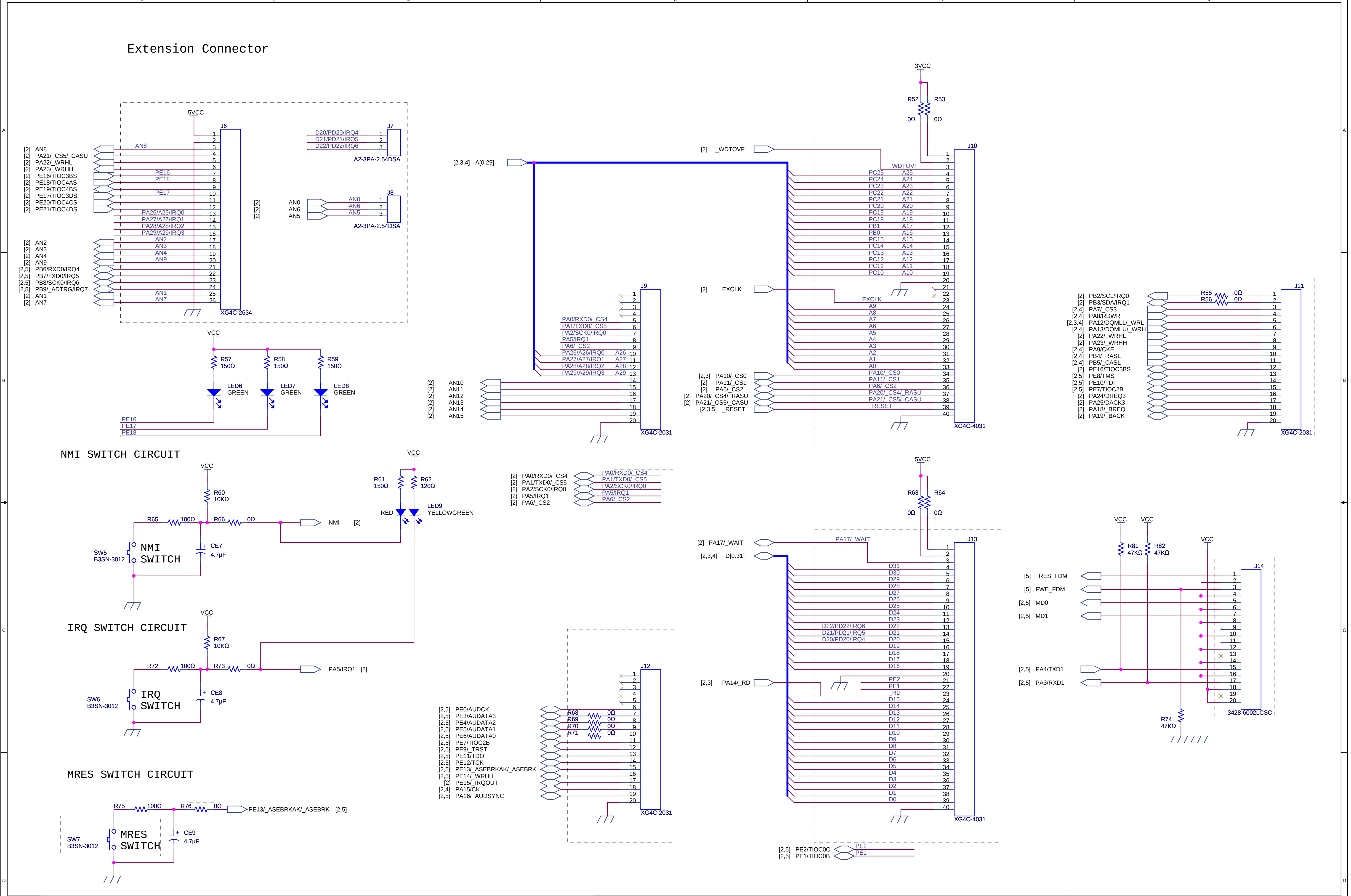
4:ON FLASH WRITE PROTECT
4:OFF FLASH UNLOCK

CHANGE	Ver. 1.0	SCALE	DATE 07-01-18

RENESAS SOLUTIONS CORPORATION

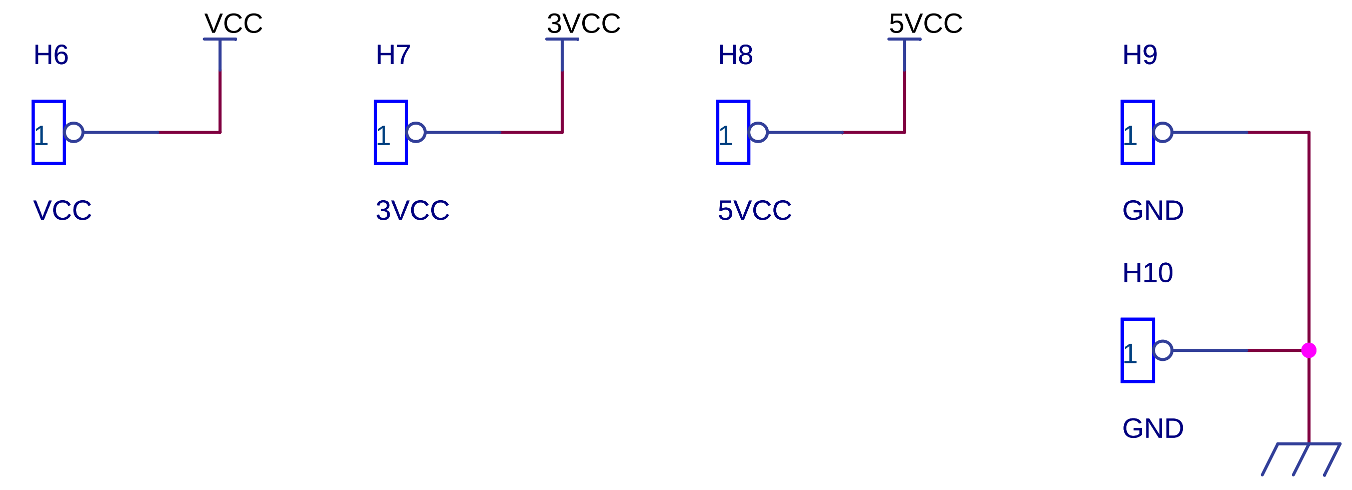
DRAWN	CHECKED	DESIGNED	APPROVED

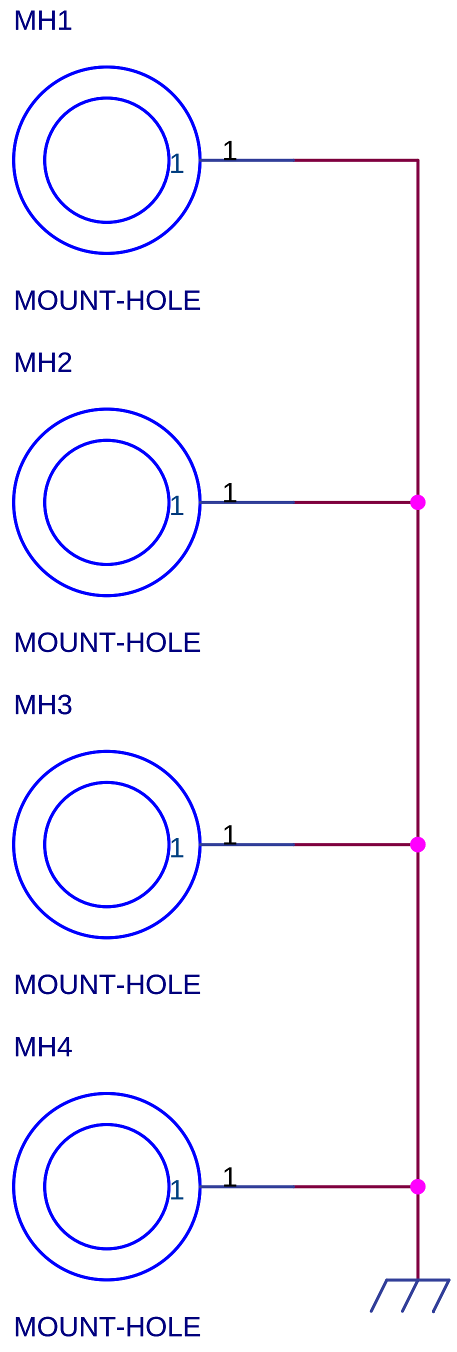
M3A-HS86
H-UDI/RESET/UART/POWER (5 / 7)
DK30504



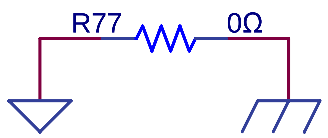
CHANGE			RENESAS SOLUTIONS CORPORATION				M3A-HS86
			DRAWN	CHECKED	DESIGNED	APPROVED	BUS CONNECTORS/PUSH SW (6 / 7)
		SCALE					
	Ver. 1.0	DATE	07-01-18				DK30504

TEST PIN





AGND-GND



CHANGE	Ver. 1.0		RENESAS SOLUTIONS CORPORATION			M3A-HS86
		SCALE	DRAWN	CHECKED	DESIGNED	APPROVED	OTHERS (7 / 7)
		DATE 07-01-18					DK30504

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SH7086 CPU Board
M3A-HS86
User's Manual

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M3A-HS86
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